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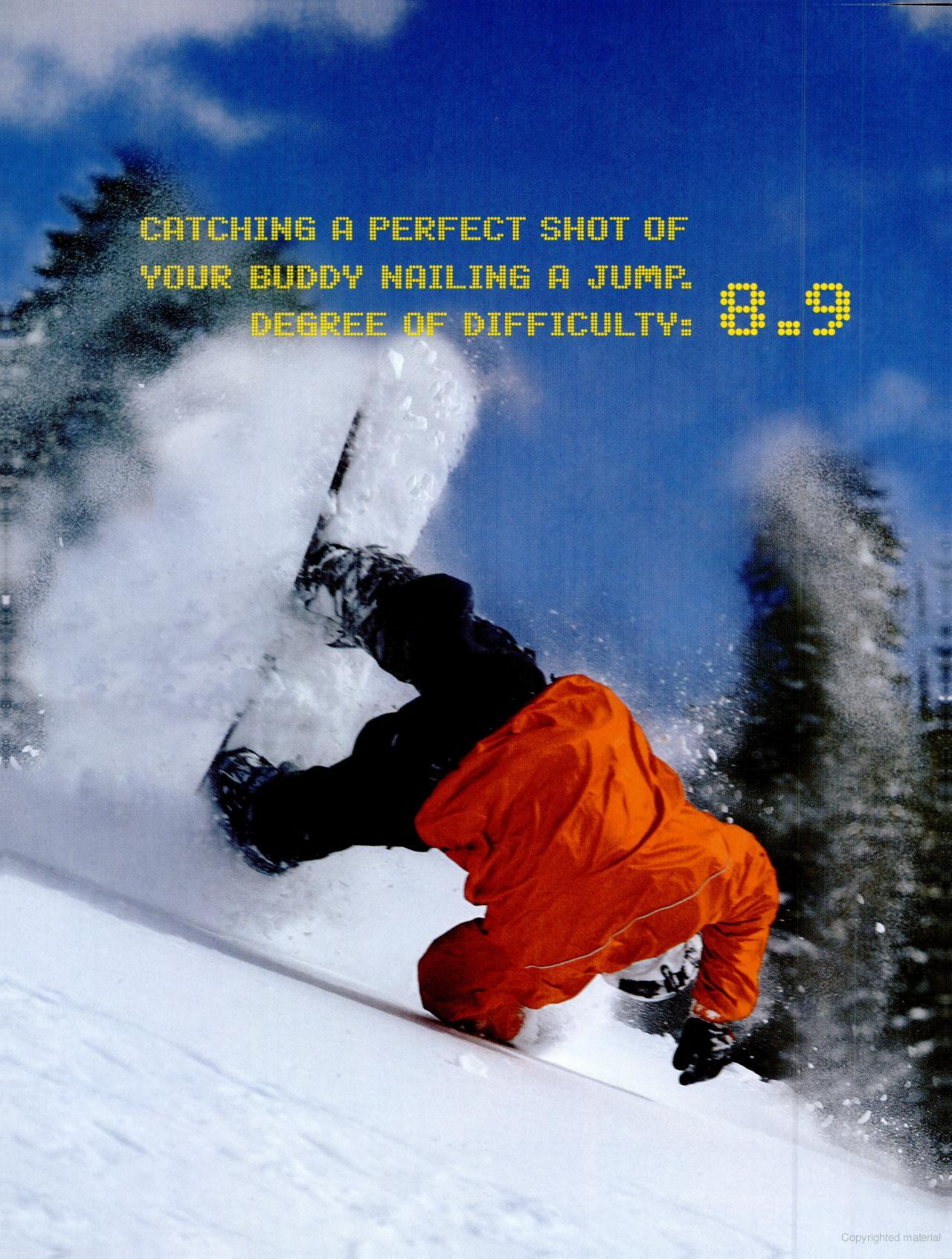

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Release Notes

E-mail from the Front Lines

For almost nine years now, I've e-mailed, web-surfed, downloaded media, and posted on message boards practically every day of the week. I thought I had seen it all, and no "Internet phenomena" could ever again impress me. Well, I was wrong. In the span of just a few days recently, I witnessed what I'll call "new online highs and lows."

First the lows: A reader sent me an e-mail that included a tech question about our recent ATI versus nVidia benchmarking. I forwarded the letter to Will Smith, our technical editor, who responded directly to the reader. The reader then sent Will's response to a third party, who took it upon himself to post the response to an online message board—*without Will's permission.* But then the situation got even more despicable. After Will's first e-mail was posted, someone *fabricated* a second e-mail in Will's name—a very damaging e-mail that portrayed *Maximum PC* as sloppy and corrupt—and then forwarded it to someone else, who then posted it on the same message board.

Did anyone on the message board ever consider the *authenticity* of the outrageous statements supposedly emanating from Will's keyboard before calling for his head on a platter? No. In the world of online message boards, we tend to read all postings at face value—even private e-mails that have been posted without the original writer's permission or stamp of authenticity.

During this episode, I was blown away by the ease with which a malicious bastard was able to hurt the magazine's reputation with a forged message. I was also disturbed by people who thought it was perfectly reasonable to post relayed messages without the original letter-writer's permission. But kudos go to the forum moderator for investigating the matter, and letting his patrons know they had been duped. My take-away on this? In some cases, web content really is as untrustworthy as some would have us believe.

But this column does end on a high note. Lest anyone think that the Internet hasn't changed the world in a fascinating way, I'd like to report that on March 21, two days into the war in Iraq, I received via e-mail a case-modding contest entry—*from a soldier deployed in Kuwait.* The staff sergeant conceded he didn't really have a "home-made" rig, but explained his submission thus: "The system is the AMDWS—Air Missile Defense Workstation. I use it to detect and track Scud missiles so that I can warn any area at risk. It's SCSI and Unix-based, but that's all I can really tell you for security reasons." The soldier also sent some digital photos of himself and his comrades right on the front lines.

All this two days *after* the war had begun. It was the most vivid demonstration of the Internet's power to quickly and efficiently disseminate information that I had ever seen. I'm still impressed.

—JON PHILLIPS

If you're a deployed military man or woman reading this now, and would like to send Maximum PC *some news reports or digital images from the front lines, we'd be very interested in receiving them. History can be written by those who make it.*

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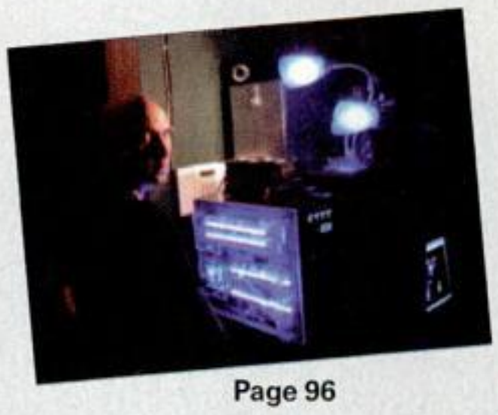

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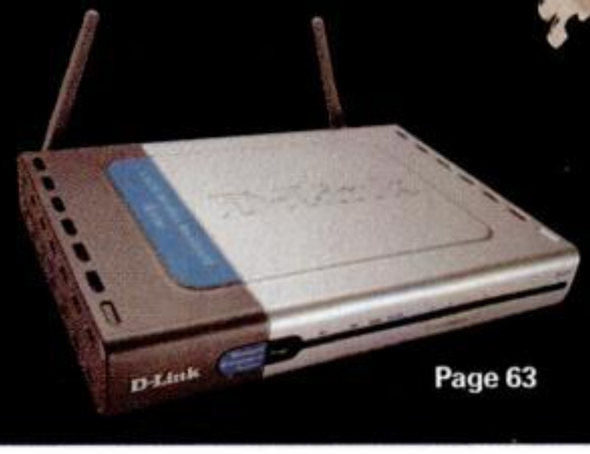

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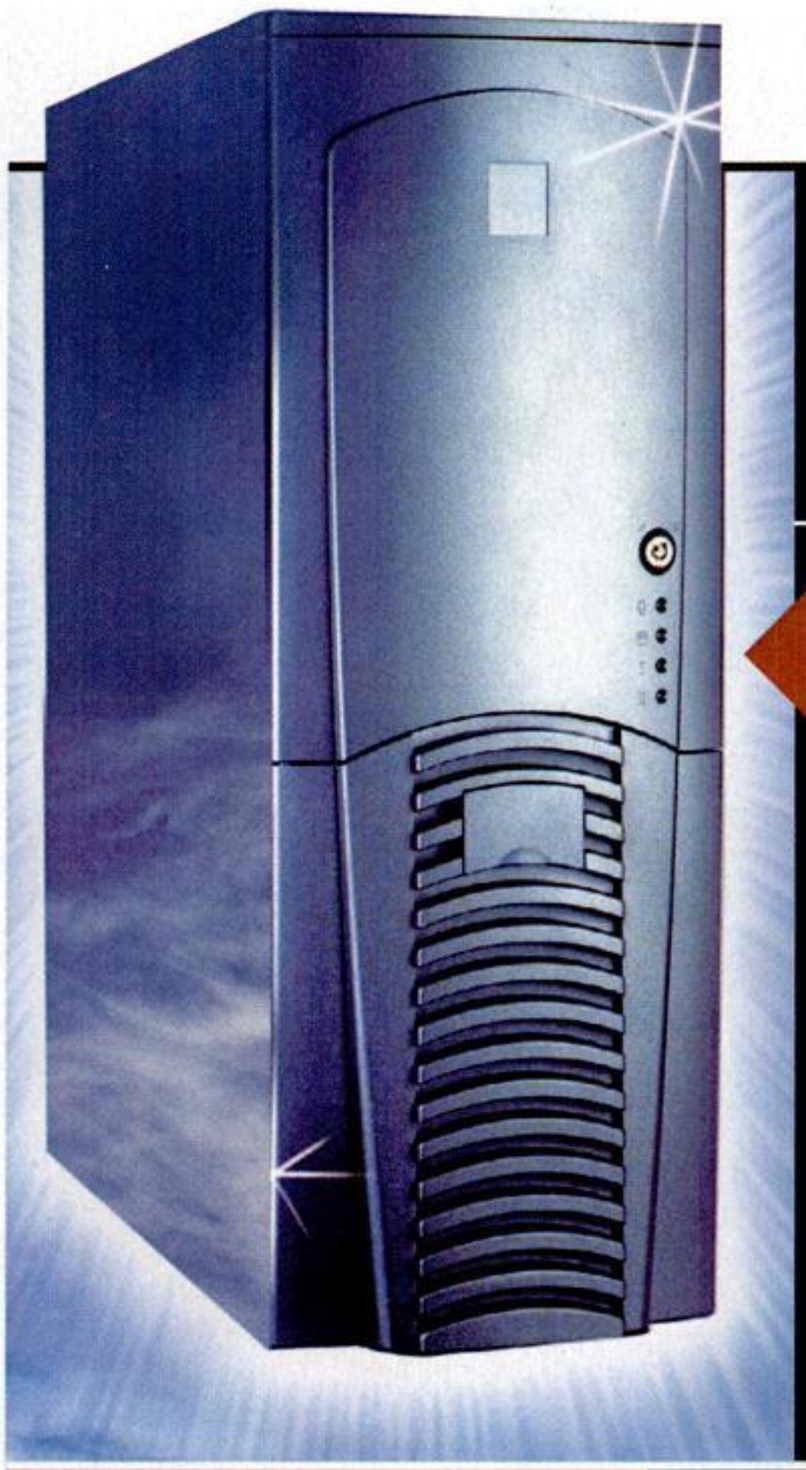

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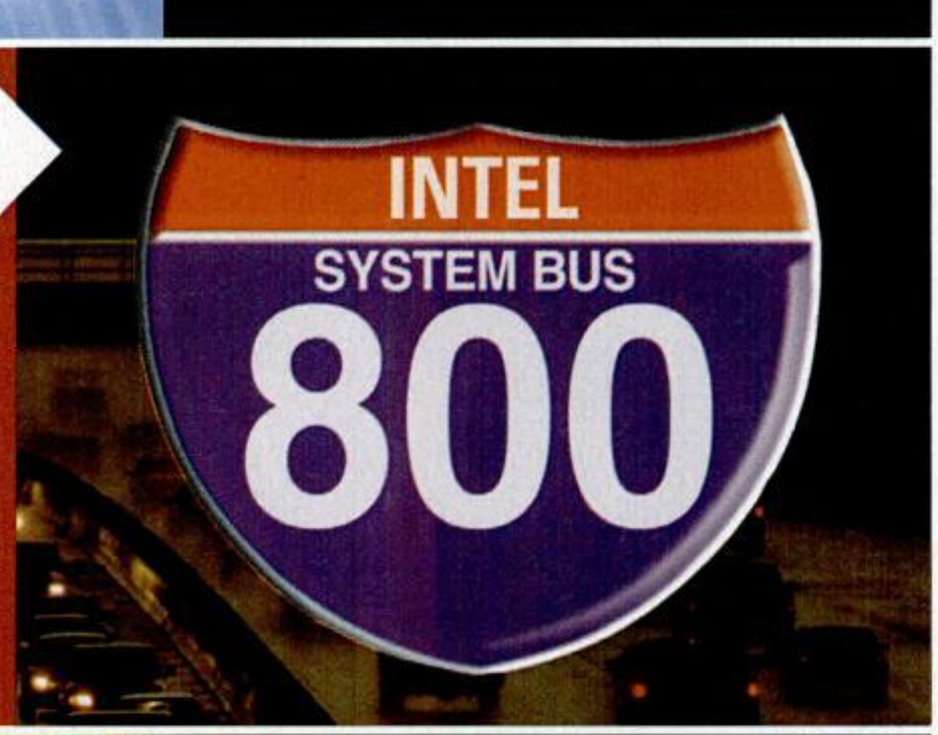

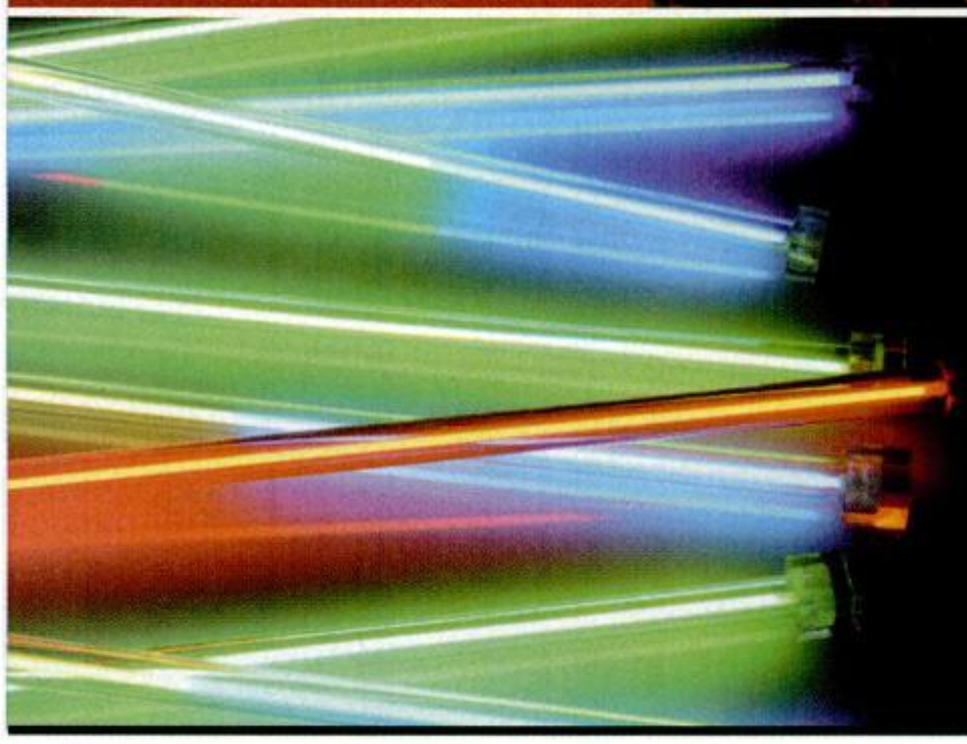

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PC Accessories
It's a mod mod mod mod world. Do you have what it takes to live in it? You will when you see these 20-plus products for tricking out a PC.

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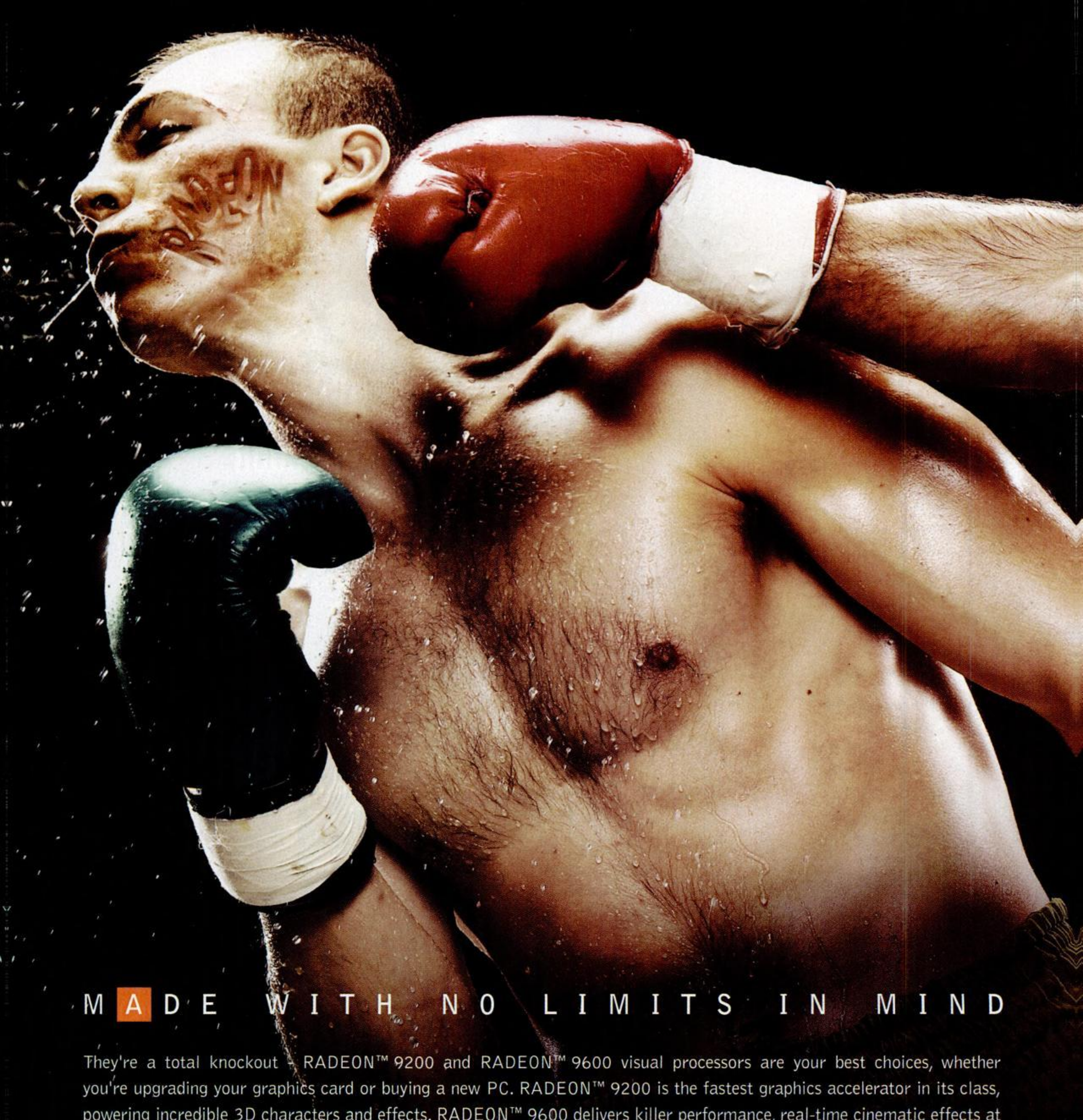

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In/Out

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GOOD ENOUGH FOR THOMAS THE TANK

I'm wondering why a "high-end gamers" magazine even bothered looking at a $200 Walmart system, much less reviewing it ["Ultimate Budget Upgrades," April 2003]. I bought one, and I haven't had any problems with it. I needed to upgrade two PCs (one for my boys, four and six years old, and one for my parents), and this was the easiest, most cost-effective way. Mind you, the extent of my boys' "gaming" involves Bob the Builder and Thomas the Tank, but the Walmart PC works like a dream for them.

I don't think you gave it a fair shake. It's a great system for someone on a really tight budget, and you can add in other stuff if you need to. Cripes, even with the price of a Walmart monitor, it's still only going to hit you for $350. It may not be a screaming speed demon for pro gamers, but for a start, it gets the job done, and it really had no business even being mentioned in a magazine written for pro gamers.

—BETTINA DELANEY

EDITOR-IN-CHIEF JON PHILLIPS REPLIES: I beg to differ! *Maximum PC* isn't solely written for "pro gamers." PC gaming is indeed the most popular computer activity among our readers, but image editing, video production, MP3 collecting, and pure system building also rank high, among other "general consumer"-type activities. That's why we run so many non-gaming-oriented feature stories, reviews, and benchmarks.

We reviewed the Walmart PC precisely because we always focus so much attention on the ultra-high-end. For a change of pace, we wanted to show readers exactly what's being sold on the other end of the spectrum. And I think you and our editors are in agreement when it comes to the Walmart PC's merits. As we wrote in the review, "Let's look at the machine's bright side. It costs just $200 and takes care of all your office tasks for the price of a WinXP Pro license alone."

MINI-ITX: YOU JUST DON'T GET IT

Maximum PC and Walmart both missed the point. Your rant in April about how "wrong" the Walmart PC is wasn't entirely correct. While the VIA mini-ITX motherboards are not designed to be put in full desktop cases (what was Walmart thinking?), they are perfect for those of us pushing for an ultra-compact, silent PC for living rooms and cars, etc.

When we only want to do simple things like watch DVDs, play music, and have a PVR all in one system without any background noise coming from the system itself, these mini-ITX boards fit the bill perfectly. No one wants, or expects, gaming performance out of these boards. Trying to run a game on one is ludicrous. Check out **www.mini-itx.com** or **www.linitx.org**. You'll get an idea of the intended uses for these great little boards, and why their popularity is growing.

It's a downright shame that Walmart destroyed the true intent of these boards by putting them in such a messy system.

—PAUL ROBINSON

CONFUSED—BUT QUITE CANDID

In response to Thomas McDonald's comments in his review of the *Sims Online* in your March 2003 issue, I must protest the complete lack of sensitivity and discretion in his article. He described an individual working in a brothel who claimed to be a "girl," as possibly being "a confused young man in Spokane."

To make it clear, I was not confused in the least about what I was doing. It's just... well... after staring month after month at Thomas' picture in his Game Theory column, I just couldn't help myself. But he promised to keep the whole thing under wraps, and that hurt most of all (sniff).

BTW: I do not live in my mother's basement. I live over her garage. (I really do!)

—AARON GANCE

LET'S POINT FINGERS— BUT AT THE RIGHT PEOPLE

Maximum PC is an indispensable magazine

MAXIMUM PC READER SURVEY

Fill It Out, Mail It In, and Win!

We want to know what you think of ***Maximum PC*** magazine so we can do more of the stuff you like, less of the stuff you don't like, and add whatever you think is missing. Fill out the form below and send it to: **Maximum PC Reader Survey, 150 North Hill Drive, Brisbane, CA 94005**. *All* submissions received by May 31, 2003 will automatically be entered in a random drawing for **TDK's indiDVD 4X DVD Burner.** (With the indiDVD you can burn an entire disc in less than 14 minutes. That's 4.7GB of data, or 2 hours of high-quality MPEG2 video!) Photocopies of the survey will not be accepted.

Name_____

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1. How did you get this copy of *Maximum PC* ?
a) ❑ I'm a subscriber
b) ❑ I bought it on the newsstand
c) ❑ It was passed along to me by a friend

2. Month to month the magazine delivers on the promises of its cover lines:
a) ❑ agree
b) ❑ somewhat agree
c) ❑ disagree / Explain why not: _____

_____

_____

3. How many people read your copy of *Maximum PC* ? ___

4. What percentage of the magazine do you generally read?
a) ❑ 1 to 25%
b) ❑ 25 to 50%
c) ❑ 50 to 75%
d) ❑ 75 to 100%
e) ❑ Every word

5.Month to month, is *Maximum PC* worth the price?
a) ❑ Yes, always.
b) ❑ Most of the time.
c) ❑ About half the time.
d) ❑ Not enough for me to buy it regularly.

6. On a scale of 1 to 5 (1 being least important, 5 being most important), define the factors that compel you read *Maximum PC*:
___ Attitude/personality of editorial staff
___ Quality of writing
___ Quality of page layout and design
___ Quality of photography
___ Technical depth of product coverage
___ Honesty/integrity/frankness of product coverage
___ Timeliness of product coverage
___ Magazine's help in making product purchasing decisions
___ Magazine's help in fixing technical problems
___ Brand recognition
___ Entertainment value
___ Cover lines/words
___ Cover subject

7.Considering all the magazines you read, how would you rank *Maximum PC* on a 1 to 5 scale (1 being the least favorable rating) in terms of consumer value? ___

8. Considering all the magazines you read, where does *Maximum PC* fit on your list of favorites (1 being least favorite, 5 being most favorite)? ___

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MAXIMUM PC READER SURVEY *(continued)*

9. What do you think of the overall design of the magazine?
a) ❑ It's cool, I like it.
b) ❑ I think the design is too busy.
c) ❑ I think the design is too clean.
d) ❑ It's just okay.

10. Do you find the tone of the writing to be:
a) ❑ The right mix of fun and informative
b) ❑ Too serious
c) ❑ Too silly

11. In regards to the organization of *Maximum PC*:
a) ❑ It's easy to find what I'm looking for.
b) ❑ I wish it were easier to find what I'm looking for.

12. On a scale of 1 to 5 (1 being the least favorable rating), which of the following are you interested in purchasing?
___ Last 12 issues in PDF format on a single disc
___ *Maximum PC*–branded stickers, posters, calendars, shirts, hats
___ Monthly electronic version of magazine that would replace print version
___ A less-expensive, disc-less newsstand option

13.How would you rate the disc content? Choose one.
a) ❑ Love it!
b) ❑ Appreciate it most of the time.
c) ❑ Occasionally find it useful.
d) ❑ Couldn't care less about it.

14. What do you think about the disc interface?
a) ❑ It's stunning and easy to use.
b) ❑ It could look better, but it's easy to use.
c) ❑ Could use an upgrade.

15. Do you want more or less of:

	More	Less	Same
a) In/Out	____	____	____
b) Quick Start	____	____	____
c) Watchdog	____	____	____
d) Head2Head	____	____	____
e) Features	____	____	____
f) Doctor	____	____	____
g) How To	____	____	____
h) In the Lab	____	____	____
i) Reviews	____	____	____
j) Rig of the Month	____	____	____

16. Would you like to see more or less "babe photos" in the magazine?
❑ More
❑ Less

17. Do you prefer:
a) ❑ Stories that tell you how to do something to your PC.
b) ❑ Stories that inform you about new PC technologies that may be coming in the next year.

No purchase is necessary to win. The odds of winning depend upon the number of entries received. Future Network USA cannot be responsible for lost, late, misdirected, or incomplete entries. The prize is nontransferable and no substitutions will be allowed. Winners will be determined by a random drawing of all valid entries and the decision of Future Network USA shall be final. This contest is open to residents of the United States only. Return of any prize or prize notification as undeliverable will result in disqualification and an alternate winner will be selected. Winners are responsible for paying any income taxes on the value of the prize received. Void in Rhode Island, Puerto Rico, and where prohibited by law.

for anyone serious about computing. But expertise in computing doesn't always translate into expertise in other areas. I refer to Thomas McDonald's remarks in the March 2003 issue, regarding *Sims Online* as a place where homosexuals prey on unsuspecting children.

Had McDonald done his research, he would have discovered that 98 percent of all child molesters are heterosexual in orientation. The attraction is the youth of the victim, not the gender. I do know something about this issue. I'm a single gay man raising an adopted son—a child who was abused by one heterosexual foster parent, and beaten by a second heterosexual foster parent. I did my research.

Now, if by "perverts," McDonald means anyone who preys on the young, regardless of orientation, then we are in full agreement; there's no question but that he is referring to a clinically defined paraphilia. But a casual reader might believe that McDonald's remarks imply a blanket condemnation of all gay people who access *Sims Online*.

While I respect McDonald's knowledge of computing and actually agree with many of his assessments of *Sims Online* and its darker underside, I resent the gratuitous condemnation of a whole class of people.

—DAN GOODMAN

CONTRIBUTING EDITOR THOMAS MCDONALD REPLIES: I appreciate Mr. Goodman's thoughtful letter, which gives me an opportunity to clear up a context problem I only noticed after the fact. The phrase "potential perverts" referred to child predators, not to all homosexuals. I do, however, stand by my concerns for the safety of this environment for children. I merely singled out gay chat areas because, as I mentioned, the number of them is significantly disproportionate to the percentage of the population that is, in fact, gay.

MORE GAMING COMPUTERS = MORE GAME TITLES

In response to Duane Jeffers' letter-to-the-editor published in the March 2003 issue of *Maximum PC*, Alienware would like to reply by saying, "Our souls are just fine and still with us, thank you."

Just because Best Buy introduces Alienware systems to a wider, more mainstream market, doesn't mean that we had to sell our souls to get there. The systems we offer in Best Buy are the exact same high-performance, custom-built systems that are offered on our web site and have won awards in *Maximum PC*. They are configure-to-order systems built with the same high-quality name-brand components, and they undergo the same rigorous 200-point quality control process and testing gauntlet as every other system we sell. We are still the same system builder that has always thrived on a simple principle: "Build it as if it were your own."

Hardcore PC gaming enthusiasts will recognize the fact that the PC gaming market will only benefit from Alienware being in Best Buy and other retailers. If it wasn't for companies like Alienware attempting to strengthen and broaden the PC gaming industry, all of the quality games would go to the consoles and we would all suffer. More PC gamers means more PC games being purchased, which in turn, leads to more incentive for the developers to develop newer and better PC games. Bottom line: We're all in it for the games. No PC games, no PC gamers.

—KEVIN WASIELEWSKI, HARDCORE GAMER AND ALIENWARE VP

THE RIGHT TO DISAGREE

I am a retired soldier, and I commend you for being honest and fair in light of this Patriotic PC flap. This is exactly why I swore an oath to the Constitution. While I do not agree with every issue, I try to hear the reasons and give a fair assessment. I've been spit on in airports when returning home for my service obligations, and my brother caught people trying to take the flag off our house. I'm not going to get all political here, but I just wish those who are all too willing to turn a deaf ear to a cause they don't personally believe in will give the next guy a fair shake, and show respect.

—DEOPRESSO LIBRE

OR WE COULD HIRE A GUY FROM CHIPPENDALE'S

I'm not interested in the e-mail address of Elizabeth, your "Speed Trials" model, but how about some hot single guy's? Yes, you do have female readers too!

—ALISON D. CAMPBELL

FORMER MAXIMUM PC TECH SUPPORT COLUMNIST DICK MATTHEWS REPLIES: You rang?

CRUDE LANGUAGE: THE LAST WORD

I am yet another reader who is getting tired of your crass and crude style, and your need to use profanity and teenage-mentality gutter language in your magazine. The only people who condone your style are those who themselves use profanity freely, and therefore see no harm in it. Is that your style? Looking to fit in and "be cool"? One dirty pig does not call another dirty pig dirty, does it?

I used to be impressed with your magazine, and looked forward to getting

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each new issue, especially the CD with the software! However, I just can no longer justify putting up with, and tolerating, the filth. There are plenty of other, more professional quality magazines out there. Do you understand what professionalism is all about?

I shall be letting my subscription expire, and am starting one with *PC Plus*. For comparison, you can see how a magazine can be published without the trash. You need to grow up, but I'm sure that your magazine groupies, who sound like radical, "cool dude," teenagers, do not agree with me.

—DAN SMITH

EDITOR-IN-CHIEF JON PHILLIPS REPLIES: I'm running Mr. Smith's letter this month not to mock or even disagree with him, but to show our more "language-liberal" readers exactly what some people find so ugly in *Maximum PC*. America is a land of many nations, and it's clear there's a big divide between the Nation of Potty Mouths and the Nation of Tidy Mouths. *Maximum PC* does err towards potty mouth territory, but we do so without apology—because that's who we are. Love it or leave it, we'll still love you in the morning.

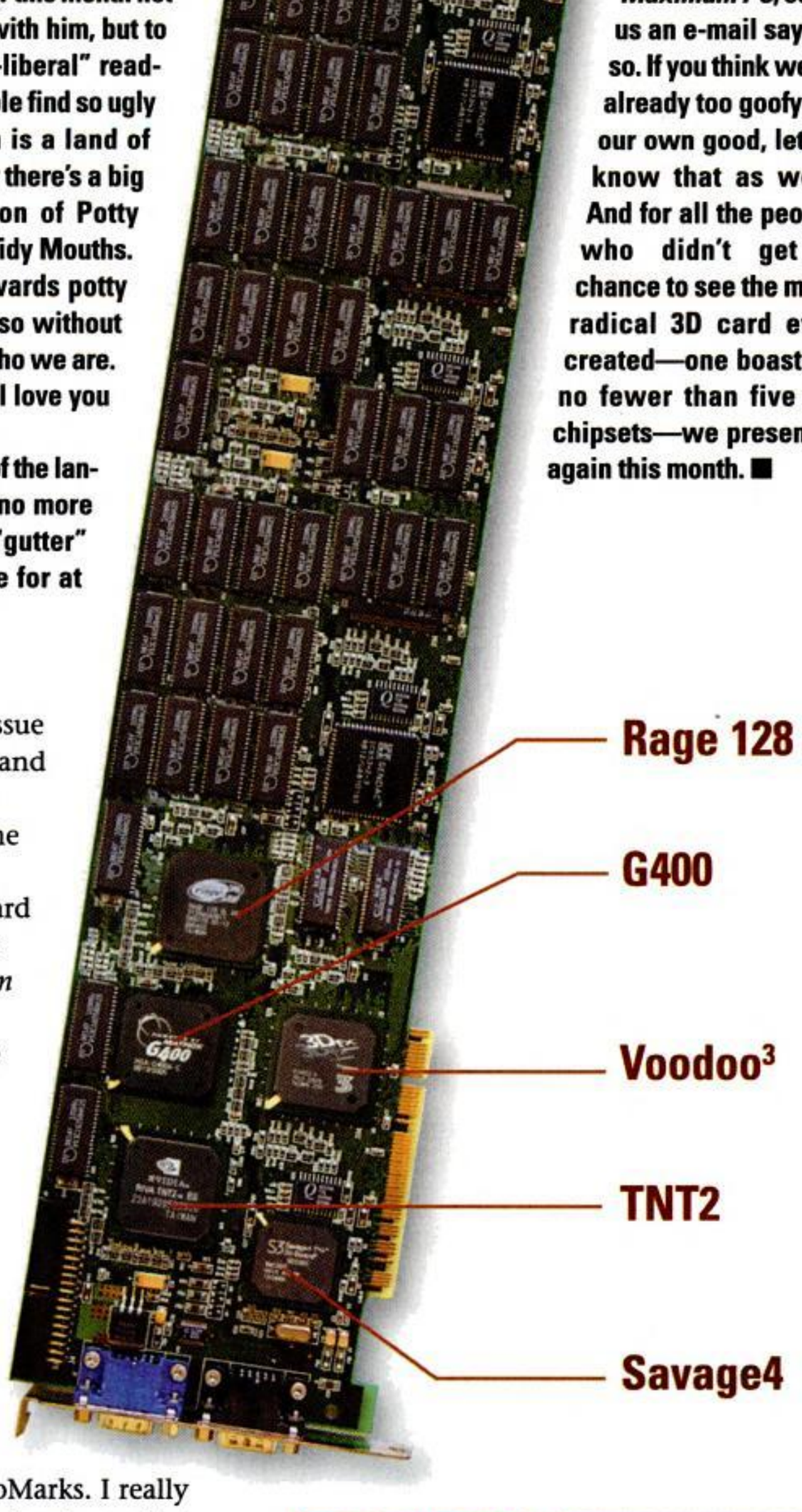
That's it, folks. The end of the language debate. You'll read no more arguments for or against "gutter" language in this magazine for at least one calendar year.

WHY DITCH GLITCH?

I was reading my April issue *Maximum PC* last night, and there was an interesting spoof of a fantasy toy: the platform-independent, do-it-yourself motherboard set. I started reminiscing about my older *Maximum PC* editions, and I remembered a back-page column called "Glitch." So I dug through my old editions, and lo and behold, there it was in the back of September 1999—the greatest videocard of all time, the Bitchin'fast! 3D2000 by VideoLoca! that benchmarked an incredible 425 BungholioMarks. I really miss these articles on the hardware that never was. Any chance of reviving Glitch even on a part-time basis?

—JOHN HAINS JR.

EDITOR-IN-CHIEF JON PHILLIPS REPLIES: We cut Glitch because we felt its quality was slipping, and we didn't want to break the first rule of magazine satire: If you can't make it at least half-way funny, don't even try. Let's face it, there's nothing more pathetic than failed attempts at humor. That said, we did have fun creating My Lil' Mobo, and if enough readers liked it too, they should let us know. We'll oblige by running PC parodies on a quarterly basis. If you'd like to see more satire pieces in *Maximum PC*, send us an e-mail saying so. If you think we're already too goofy for our own good, let us know that as well. And for all the people who didn't get a chance to see the most radical 3D card ever created—one boasting no fewer than five 3D chipsets—we present it again this month. ■



CUT, COPY, PASTE

➤In our March issue we failed to note the web site of one our case modding photographers. Go to www.gruntville.com to see John "GruntmaN" Krump's full coverage of the case modding scene

COMING NEXT MONTH

IN THE PRESCRIPTION-STRENGTH JUNE ISSUE OF

MAXIMUM PC

Videocard Answers

Every annoying problem—*fixed*

Every control panel setting—*explained*

Every confusing term—*defined*

Every major videocard—*benchmarked*

Our most comprehensive videocard how-to guide ever!

(And if you have some videocard questions you'd like answered, please send them to input@maximumpc.com with the subject line "videocard answers.")

Also...

Third Annual Geek Quiz!

See if you can out-score the Maximum PC brainiacs! 60 hard-core questions. Can you answer them all?

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Quick Start

The beginning of the magazine, where articles are small

PCI: Dead. AGP: Dead. Say Hello to PCI Express

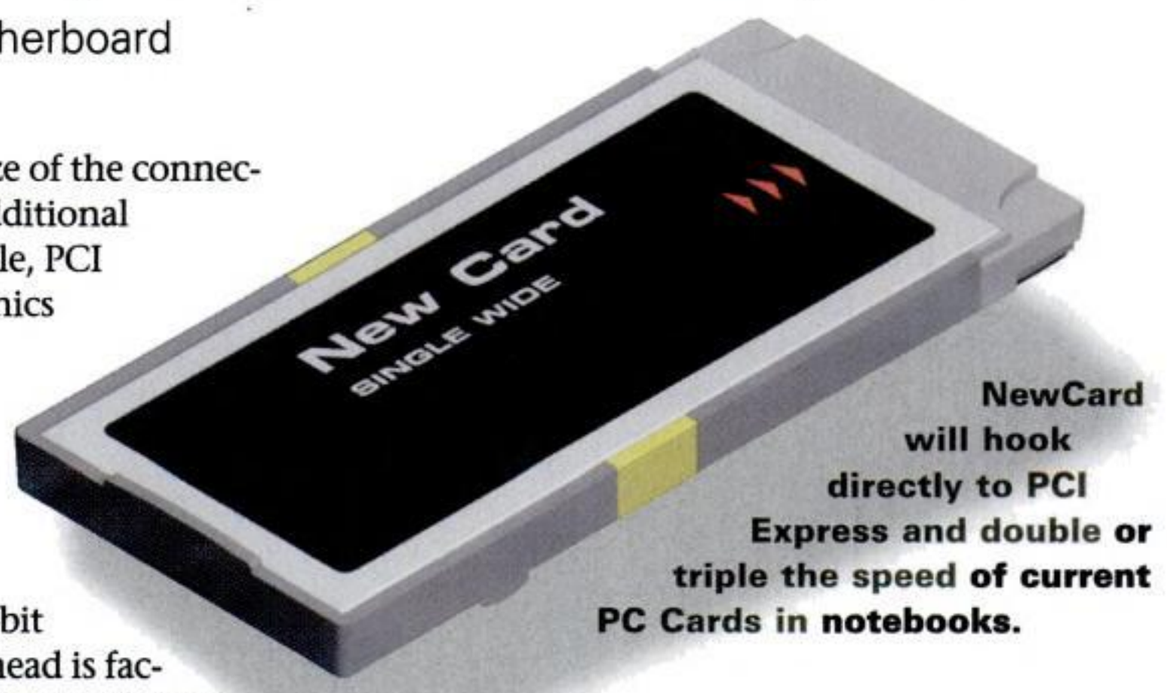
New bus protocol will completely reinvent your motherboard

PCI Express appears ready to make its debut—on schedule—in Intel's upcoming Grantsdale chipset later next year. Formerly code-named "3GIO" (for "third-generation I/O"), PCI Express will smash current bandwidth and power-supply bottlenecks, and send AGP, PCI, and PC Cards the way of the dodo. It's a good thing that PCI Express is ready to roll, because the Grantsdale chipset is being readied to support Tejas, a truly new core processor architecture from Intel that some are already nicknaming "Pentium 5" (see related story on page 44).

PCI Express—which is both a hardware interface standard and a transmission protocol—is expected to endure on motherboards for the next 10 years or more. The key to this longevity will be unprecedented scalability. That's right: Notebooks, desktops, workstations, and servers will *all* adopt the wondrously generous PCI Express. For this reason, the new I/O standard will be even more revolutionary than PCI was in 1992, when it began pushing out ISA.

Like other emerging PC technologies, the PCI Express architecture ditches a wide parallel bus (which requires complex and expensive electrical paths) in favor of a serial bus that can scale to higher speeds with far fewer wires. When configured in a standard desktop PC, PCI Express will use an "x1" interface—a 1-bit connector about an inch and a half long that can transfer roughly 500MB/s versus PCI's puny 133MB/s.

More bandwidth can be added by increasing the size of the connectors and using additional lanes. For example, PCI Express for Graphics is an extension of the basic spec, and requires that graphics cards use an x16 connector (and a 16-bit lane). After overhead is factored out, the new graphics bus should support about 4GB/s in each direction—roughly four times the speed of AGP 8x. Intel, one of the main proponents of the spec, says PCI Express for Graphics should offer enough capacity to bring us to the gamer's Holy Grail of photorealistic rendering, and beyond.



NewCard will hook directly to PCI Express and double or triple the speed of current PC Cards in notebooks.

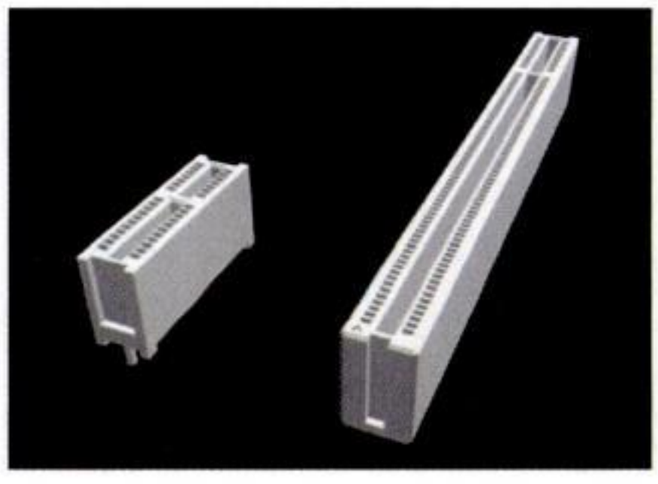
Bus traffic isn't the only problem PCI Express for Graphics will try to solve. One current limitation of the AGP spec is the amount of power that can be delivered to the AGP slot. Most desktop motherboards deliver just 25 watts of power to the slot, and this can be problematic. Even the original GeForce card had difficulties when motherboards couldn't deliver consistent, sustained power, and current high-performance cards like the Radeon 9700 Pro and GeForce FX 5800 Ultra require power from auxiliary connectors just to run.

The initial version of PCI Express for Graphics will supply 60 watts of power to the slot. PCI Express for Graphics cards will lean heavily on 12-volt power, so a redesign of power supplies may be necessary. Of course, more power means more heat, so manufacturers will have to cope with cooling 60-watt videocards. The heatsinks used in current videocards would probably turn into sparklers under such stress, so it's possible that ducting air directly from a PC's side panel may be necessary (at a minimum) to keep our *next*-next-gen graphics chips cool.

So what will the new hardware look like? An initial proposal described a convenient, fully enclosed, hot-swappable module design that would ditch the bare-edge connector we're used to. The proposed modules would allow swapping parts without even opening up a PC case—and without even powering down. But that plan was scrapped, and desktop PCs will continue to employ the familiar edge-connector formfactor. Notebooks, however, will turn to a novel approach called NewCard.

NewCards will plug directly into the PCI Express bus, and are designed to replace the ubiquitous PC Cards currently in use. Because PC Cards can no longer be stacked in today's thinner notebooks, NewCard slots will be placed side by side. A single NewCard is about half the width of a PC Card. When used in the double-wide configuration, two NewCards will take up the same space as a single PC Card. The new notebook standard will also reduce power requirements (and give consumers a bit of a price break) because it does away with the need for a separate controller chip that PC Cards currently require.

While the modular system for desktops was passed up, system builders and Intel still believe NewCard could be used to add peripherals to desktop systems.



The 1-bit PCI Express connector (left) will replace the PCI slot (right), and provide almost four times the amount of bandwidth of the latter.

DARE TO COMPARE: MOBO BUS BANDWIDTH

ISA	16.7MB/s
PCI	133MB/s
AGP 1x	266MB/s
AGP 2x	532MB/s
AGP 4x	1.05GB/s
AGP 8x	2.1GB/s
PCI Express for Graphics	8GB/s

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The Strange World of USB

It's not just for mice and keyboards anymore

Although originally intended to be the connection standard for low- and medium-bandwidth peripherals, USB is now emerging as the preferred interface for comfort, hygiene, and beverage service solutions.

The idea of whirling blades protruding from your USB port might seem a little scary at first, but the blades of the FlyFan from Kensington ($20, www.kensington.com) are actually made of a soft, rubbery material. You can merrily stick a finger right into the props for a cool, buzzing-bee Foley effect.

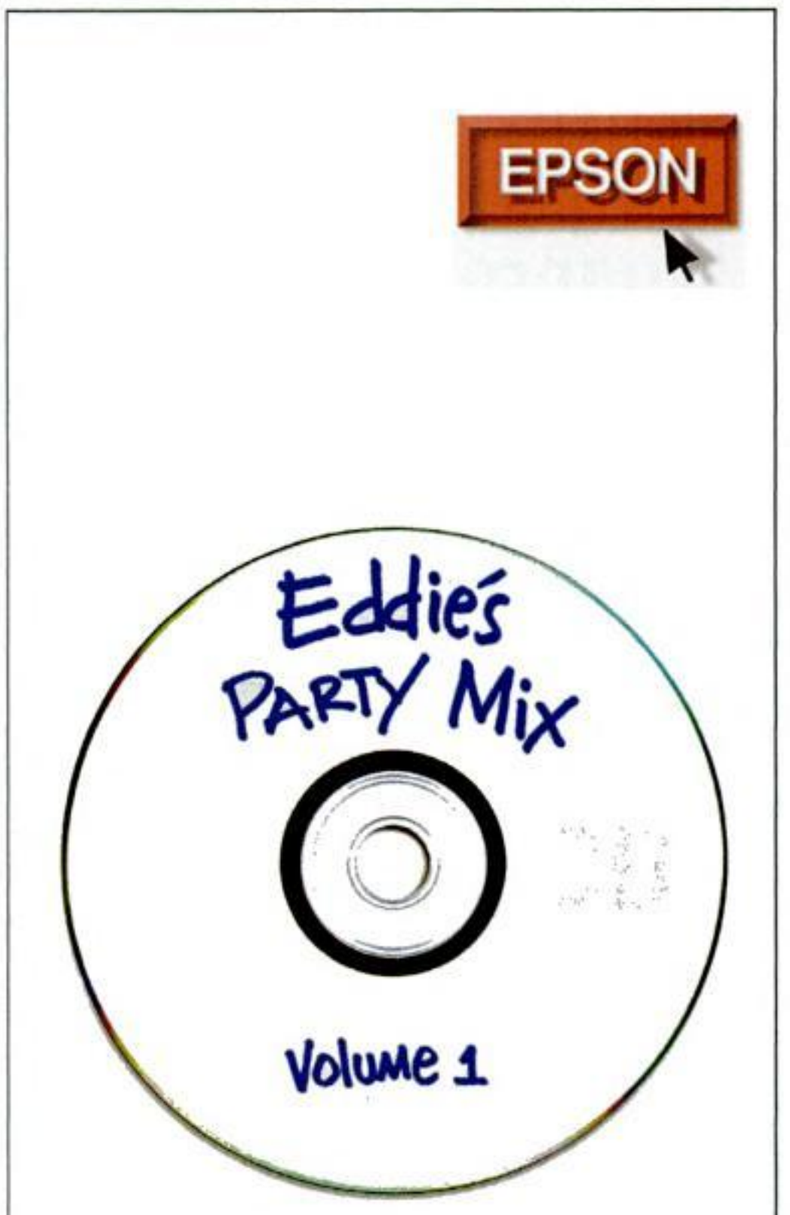
Naturally, the strangest USB-powered peripherals come from Japan. More specifically, from the Dreams Come True Company (**www.dct-net.co.jp**), where nothing is too unlikely, such as the USB Cupwarmer.

Again from our friends at Dreams Come True Company, we present the USB Toothbrush. Even the hand holding the package seems to regard this product with suspicion.

But wait, there's more! The USB Can Warmer guarantees that you'll never, ever have to endure an ice-cold can of Diet Coke ever again! (Wimps.)

Rounding out the parade of USB freakiness from the Dreams Come True Company is the 20x27.5-inch USB Knee Blanket—we are not making this up. The blankie keeps your knees toasty while your lap bakes beneath a piping-hot laptop housing a 3GHz CPU. Or maybe it's for the kitty.

Just in case you thought USB was having all the fun, here comes the FireDino from Charismac ($75, **www.charismac.com**). A "menacingly fast" four-port FireWire hub, the FireDino's eyes and mouth light up just like you'd expect them to. But don't put too many of them together. Things could get ugly.



THAT WAS THEN.

THIS IS NOW.

NOW YOU CAN PRINT IMAGES AND TEXT DIRECTLY ONTO CDs AND DVDs.

For the first time, you can afford to customize disks any way you want-without the hassle of adhesive labels. Sound good? Well, it looks even better. To hear more, visit epson.com/960.

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World's First Blu-ray Recorder Lands in Japan

Sony's new optical medium stores 23GB

The botched introduction of affordable DVD recorders put egg on just about every manufacturer's face. But is it possible the manufacturers didn't bother hashing out a single standard because they were too consumed by Blu-ray, the *real* storage technology of tomorrow?

Blu-ray can write information fast enough to record high-definition TV content, and can store enough information on a single disc to make doing so practical. A number of next-gen Blu-ray devices have been prototyped over the last 18 months, but now the technology is real: This April, Sony released the very first consumer Blu-ray disc recorder in Japan.

The uncertain future of optical technology just got a little clearer.

Conventional DVD recorders use a 650-nanometer red laser that can record up to 4.7GB on a single disc. Blu-ray recorders, on the other hand, employ a 405-nanometer blue-violet laser. The much finer resolution of this laser allows up to 27GB of data on a single disc. "Fine" equals "more" in the world of data writes.

Sony's BDZ-S77 recorder is currently available only in Japan; don't expect to see any Blu-ray devices debut in the U.S. until 2004, at the earliest. But now that Blu-ray's gone from vaporware to hardware, we know exactly what to expect from the next wave in recordable technology. Here are some answers to basic Blu-ray questions:

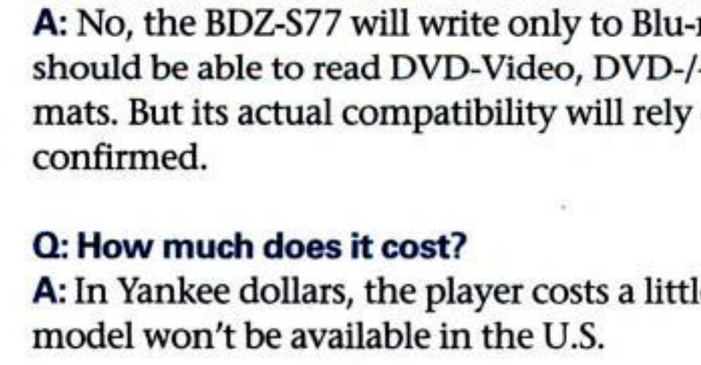
Q: How much video will each 27GB disc store?
A: Sony's Blu-ray recorder has six different quality settings. The highest quality setting can record two hours of 1080i HDTV (at 24Mbps). The lowest quality setting can record up to 12 hours of standard television (at 4Mbps).

Q: Can Sony's Blu-ray recorder also write to legacy DVD-/+RW formats?
A: No, the BDZ-S77 will write only to Blu-ray discs. In theory, the recorder should be able to read DVD-Video, DVD-/+RW, CD, CD-R, and CD-RW formats. But its actual compatibility will rely on the firmware, and has yet to be confirmed.

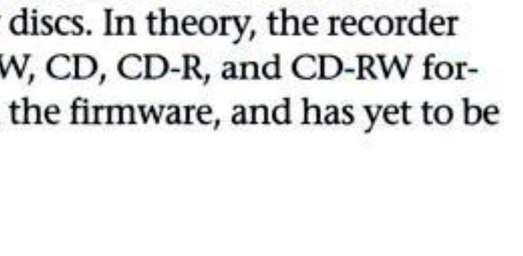
Q: How much does it cost?
A: In Yankee dollars, the player costs a little less than $3,800. But, again, the model won't be available in the U.S.

Q: Why is the initial Blu-ray release a Japan-only product?
A: Because they're way ahead of us in terms of digital broadcast content.

Q: Is there anything else that's cool about it?
A: Yeah: It can record in Dolby Digital AC3, and has a built-in BS (broadcasting satellite) tuner. That's Sony's acronym, not ours.



Got a *yen* for a high-definition DVD recorder? Actually, you'll need 450,000 of them to buy the world's first Blu-ray disc recorder in Japan.



Blu-ray wasn't intended for mass distribution of commercial films; DVD will likely remain the standard for that in the foreseeable future. And, yes, we're back to cartridges.

FAST FORWARD

BY TOM R. HALFHILL

Intel's Fabs Will Get Extreme

Extreme sports are child's play compared with the feats of skill that Intel's alpha geeks will perform in a few years. Intel claims it will be the first company to mass-produce microprocessors using extreme ultraviolet lithography (EUV), a revolutionary technology that will shrink circuit features by a factor of 10 or more. We could see processors with a billion transistors by the end of this decade.

Engineers everywhere have been working on EUV for years, and Intel isn't the only company rushing to perfect it. IBM—possibly in partnership with AMD—will race Intel to the finish line. But Intel, the world's largest chipmaker, has more at stake. Intel's aggressive schedule calls for EUV pilot production to begin in 2007–2008, followed by mass production in 2009.

Lithography is part of the process that etches transistors, wires, insulating layers, and other circuit features on silicon chips. It works like a slide-show in reverse. Instead of projecting a small photographic image onto a large screen, the lithographic process projects a large photomask image of the circuit features onto a tiny area of a silicon wafer. Chemical baths etch the features into silicon, layer by layer.

EUV will close the "lithography gap" that threatens to make the famous Moore's law (double the circuit density every 18 months) as obsolete as the 486. Since 1997, circuit features have been shrinking faster than the wavelengths of the light rays that draw them. Today, PC processors have 130-nanometer (nm) features, even though the lithographic wavelength is 193nm. That's the lithography gap. To visualize this problem, imagine trying to draw a fine line on paper with a fat crayon. It seems impossible. In fact, the lithography gap would have stalled chip evolution at the Pentium II generation if not for clever engineering tricks that compensate for the resulting diffraction effects. But the tricks greatly increase the complexity of the photomasks, and engineers are running out of tricks.

EUV dramatically reduces lithography wavelengths. Within two years, the industry hopes to pare down the wavelength from today's 193nm to a slightly smaller 157nm. With EUV, the wavelength will plunge to 13nm. Suddenly, it will be possible to draw transistor gates and other circuit features 10 times smaller than ever before. That could translate into 10 times as many transistors on a same-size chip, or smaller chips that cut power consumption without sacrificing processing power.

Intel rarely announces new fabrication technology without delivering on time. With Moore's law named after one of its founders, Intel has even more reason than other companies to keep the law on the books.

Tom Halfhill was formerly a senior editor for Byte *magazine and an analyst for* Microprocessor Report. *He is now a technical writer/analyst in Silicon Valley.*

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DO YOU REMEMBER THE DAY THAT THE NUBIANS SET FOOT ON THE MOON?

IT WAS 58 MINUTES IN THE MAKING. History changes in an instant. Never more so than in Rise of Nations, a new real-time strategy game from Brian Reynolds, lead designer of Civilization II. Experience the depth of turn-based strategy games at an RTS pace through 6,000 years of history and 18 ancient civilizations. It's the most intense RTS of its kind. Think fast. Fight faster. Defend, defeat, bargain, befriend, plot and plunder. Do it all under the gun with zero margin for error. Nothing is historically impossible and only the quick and the brazen survive.

RISE OF NATIONS™

MAKE HISTORY

RISE OF NATIONS

TEEN T CONTENT RATED BY ESRB — Blood and Gore Violence

BIG HUGE GAMES™ Microsoft game studios POWERED BY gamespy

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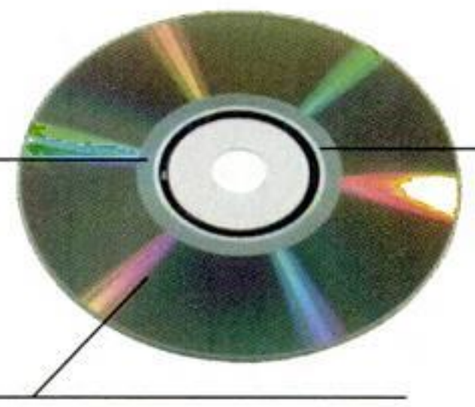
ODC Introduces the CDR-ROM

Does an extra letter make it any better?

No, it's not a typo. CDR-ROM is a hybrid media technology that would facilitate discs with pre-written, fixed content (just like old-school CD-ROMs), plus extra space for writing new content, a la CD-R. Although the format has existed on paper for years, the California-based Optical Disc Corporation is the first manufacturer to create a disc that could not only be "stamped" in the traditional mastering process, but also burned by conventional CD burners.

We can think of a lot of interesting applications for the technology—adding updates and patches to application CDs, for example. But one potential scheme has us worried. Optical Disc Corporation is pushing the CDR-ROM as an anti-piracy product, and the idea of an application disc that will work only with the PC on which it was originally installed isn't comforting.

Still, CDR-ROM is the only thing that could make us finally look forward to receiving those ubiquitous AOL discs.



ROM Area: This is the pre-recorded portion, positioned at the beginning of the CDR-ROM. Remember that compact discs are read from the center outward.

TOC: There's actually a tiny writeable area at the beginning of the CDR-ROM disc. That's where the disc's table of contents is kept—it can be added to just like any multisession CD-R.

Recordable Area: You get to record your own data in any portion not consumed by ROM data—just as long as you don't exceed 700MB.

Formfactor Watch

BIG THINGS GET LITTLE...

Sharp's Actius notebook—a mere 0.54 inches thick at its narrowest point—has dimensions that would make a supermodel jealous. The Actius MM10 weighs just 2.1 lbs., has built-in Wi-Fi, a Transmeta 1GHz Crusoe TM5800 proc, and a 10.4-inch screen. In order to better show off its trim dimensions, the Actius comes with the Sharp Connection Cradle, a docking station that holds the MM10 balanced on its edge and allows you to simultaneously recharge your laptop while using its internal hard drive as an external drive for your desktop PC.

SMALL THINGS GET SMALLER...

SanDisk Corporation is introducing miniSD, a miniature version of the flash memory standard that's designed to fit more comfortably into today's tweezer-size cell phones and ultra-mini handhelds. Up to 256MB cards will ship this year, and an adaptor is available so the new cards can be used in standard SD slots.

AND LITTLE THINGS GET BIG...

By reversing the polarity of the shrink-ray used on the miniSD card, SanDisk was also able to grow CompactFlash to a staggering 4GB capacity. Rumor has it that 6GB CF cards may not be far down the road.

GAME THEORY

BY THOMAS L. McDONALD

Too Small for Comfort

Last month, I got to spend more time using my palms for fun than I have since I was a teenager. My Pocket PC gaming feature in the April issue marked my first protracted foray through the thicket of tiny little games for people who are terrified at the prospect of being alone on a long trip with merely their own thoughts to occupy the time. I really, truly don't need to game so badly that a swarm of 1-centimeter-tall soldiers in *Age of Empires* for Pocket PC is even remotely appealing to me. But part of my job is to judge things on their own merits, and certainly a nascent genre like Pocket PC gaming deserves to be looked at for what it achieves or fails to achieve within its format. Much of what I played was good, clever, and effective. I can see it appealing to a lot of people. But a great swath of last month's research in miniature gaming was for me an exercise in torture.

Each platform develops its own "language" of design. That's not to say all games don't share common traits, but it does mean that cross-platform conversion can be a sticky wicket. *Splinter Cell* for PC, for example, works quite well. But the game still plays better on Xbox.

So it is with Pocket PC, only to a much greater degree. The PDA has a cluster of control features that are wholly unique: No other platform uses a touch screen, or is burdened with buttons designed for application use as opposed to quick responsiveness. Cramming a game made for use with a mouse, keyboard, or joystick into the PDA format is necessarily an exercise in compromise. Even when impressive—like the port *SimCity*—the results can be broken

The point of tiny games is, of course, their portability. Now you need never be without a three-year-old sub-munchkin version of *AoE*! But is anyone so desperate to play *AoE* that they can't just wait until they get home, so they can enjoy it on a nice CRT, using the familiar mouse control that won't cause hand cramps, and sitting in a comfy chair with a beer at hand, playing games the way they were intended to be played, by golly?!

If I need to game on the road—which I often do now that I'm a true-blue PPC junkie—I choose something easier to manage, something with lower expectations, like *Pocket Fritz*, *Hyperspace Delivery Boy*, or even *Darxide*, which makes good use of limited controls. Down-converting popular PC games for handheld use makes for an experience replete with sacrifices. If I'm going to play a game, I want it to be the real thing, not some dim-witted second cousin.

Tom McDonald has been covering games for countless magazines and newspapers for 11 years. He lives in the New Jersey Pine Barrens.

Don't take our word for it.
Stick with what the pros say.

"The latest version, Cool Edit Pro 2.0, is simply smokin'!...I have also used Cool Edit in my studio when other, much more expensive software simply fizzled or choked on a project– CEP2 worked like a charm!"

– Gary Dean Ahrens
DJ Times
September 2002

"A Mac-using colleague said to me recently, 'I hate Syntrillium.' When I asked why he replied 'Because they don't make Cool Edit Pro for the Mac.'"

– Roger Derry
Line Up
The Journal of the Institute of Broadcast Sound
June/July 2002

"Cool Edit Pro is an essential tool for laying down your musical ideas and finalizing them."

– Paul Riario
Guitar World
July 2002

"So here's the deal: If you're looking for a powerful Windows digital audio editing program, download a demo of Cool Edit Pro and check it out."

– Zack Price
Home Recording
October 2002

"Normally after doing a review, I uninstall the program to keep my system as simple as possible. But CEP2 is staying on the hard drive - with a desktop shortcut, too."

– Craig Anderton
Keyboard Magazine
August 2002

"Don't pass on the latest version of this affordable classic if you're into digital audio creation and editing on the PC."

– James Kim
TechTV
August 2002

"There is simply no better deal out there for the professional quality and interface it offers."

– Scott Colburn
Tape Op Magazine
September/October 2002

"Cool Edit is still the coolest thing around for editing audio on the PC."

– Al Peterson
Radio World
July 2002

"There can be few projects that Cool Edit Pro could not handle with ease, finesse and aplomb. The version 2 update has honed what was already an accomplished program."

Computer Music
August 2002

cool edit | pro
version 2

The complete multitrack recording studio for your PC

Syntrillium Software

cool edit | pro

The reviews are in and the critics agree: Cool Edit Pro 2.0 is cooler than ever. It's packed with all the latest cutting-edge features for digital audio recording, editing, and mixing. Whether you're already a pro, or just getting started with PC-recording, Cool Edit Pro has the power, features, effects, formats, and flexibility to get the results you want. Even better, Cool Edit Pro users get free access to over 2,000 royalty-free loops of every kind of music imaginable from Loopology.com. You want to pack your PC with the best in audio? Try Cool Edit Pro.

Download your copy today from www.cooledit.com.

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Head2Head

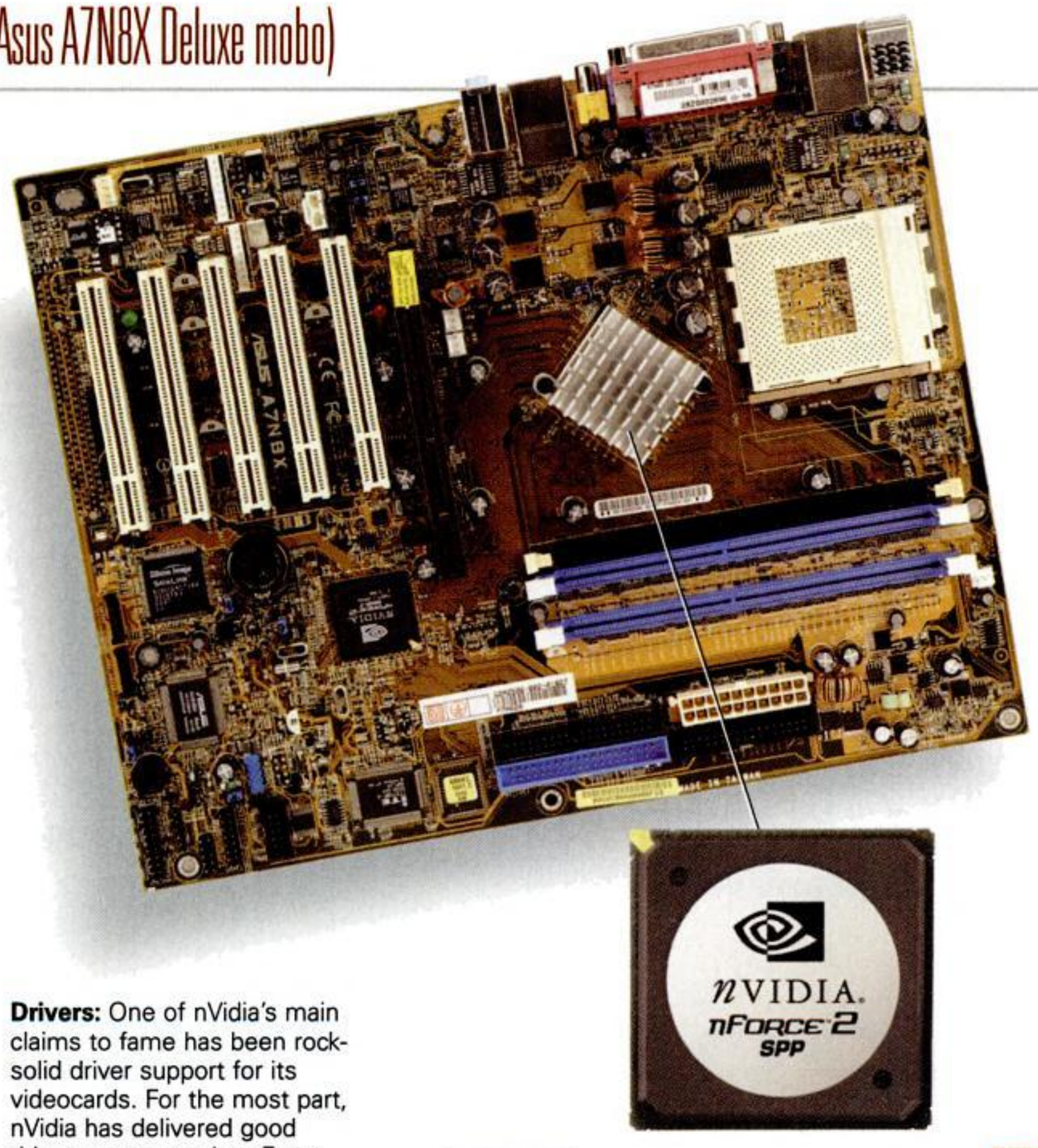
A showdown among natural PC competitors

THIS MONTH: VIA Apollo KT400A vs. nVidia nForce2

When the nForce2 outperformed the Apollo KT400 earlier this year, we thought motherboard chipsets designed for single-channel memory were finally proved irrelevant. But VIA is back with an old trick—it has optimized its KT400 and added the famous "A" designator, which marks the chipset as a top performer in the VIA product line. We've seen this move before. VIA neutralized the original nForce chipset when it revved the KT266 chipset to KT266A. But can VIA do it again? We got our hands on a VIA engineering sample mobo that uses the new KT400A and put it up against a production Asus A7N8X Deluxe motherboard.

—GORDON MAH UNG

NVIDIA NFORCE2 (in an Asus A7N8X Deluxe mobo)



Namesmanship: We've already heard of specsmanship. You know, Company A comes out with a 100MB/s ATA controller, so Company B trumps it with 133MB/s. It looks good on product packaging, and helps sell gear. But nVidia and VIA seem to have a battle of "namesmanship" going on. To wit: nVidia's best mobo chipset offers technologies called StreamThru, SoundStorm, IGP, SPP, MCP, DASP, DualNet, and TwinBank. *Whew.* When benchmarked with *TradeMark2003 SE,* we found nVidia gave us a 25 percent improvement over VIA's *TradeMark2003 SE* scores! **Winner: nForce2's marketing team**

Southbridge: With northbridge memory controller performance approaching parity these days, chipset battles are moving to the southbridge chips, and all the advanced technology that can be jammed into them. nVida's MCP-T southie is one of the most advanced on the market, with integrated FireWire A, twin 10/100 Ethernet channels, ATA/133, USB 2.0, and APU (Audio Processing Unit), which can encode multichannel streams to Dolby Digital 5.1. Who needs PCI add-in cards or discrete controller chips with all this trick stuff wired right in? **Winner: nForce2**

Drivers: One of nVidia's main claims to fame has been rock-solid driver support for its videocards. For the most part, nVidia has delivered good driver support to the nForce platform, but there have been a few snags. Some motherboards feature different designs, so, yes, they've required different drivers. Remember when you used to get northbridge drivers from AMD and southbridge drivers from VIA? The situation is like that, except nVidia's the only party involved. **Winner: Tie**

The Logo: It's obvious that nVidia understands the strength of marketing and branding. The nForce2 logo is both recognizable and suggests maturity. The KT400A, conversely, looks rather dated to us. **Winner: nForce2**

Performance: This is where the rubber hits the road. VIA showed us early numbers that indicated the KT400A was neck-and-neck with the nForce2, but our own tests show that the nForce2 still has an edge, albeit slight. In some tests, we were surprised by remarkably similar results, but in other tests, it was clear that either the nForce2 chipset or the nForce2 drivers are superior. **Winner: nForce2 (by a hair)**

Design wins: It's an understatement to say that the original nForce had a tough time penetrating the motherboard market when the VIA KT266A and KT333 chipsets ruled the roost last year. AMD-land has pretty much been VIA-land. This is backed by Mercury Research, which reports that VIA has the leading market share in the Athlon XP mobo space. Nonetheless, the nForce2 looks to be more popular than the original nForce; no fewer than six different nForce motherboards are on the market, and more are coming. **Winner: KT400A**

THE SPECS: NFORCE2

AGP	4x/8x
Frontside bus	200MHz/333MHz/400MHz
Memory support	DDR200, DDR266, DDR333, DDR400 in both single and dual channel modes
North-south interconnect	800MB/s

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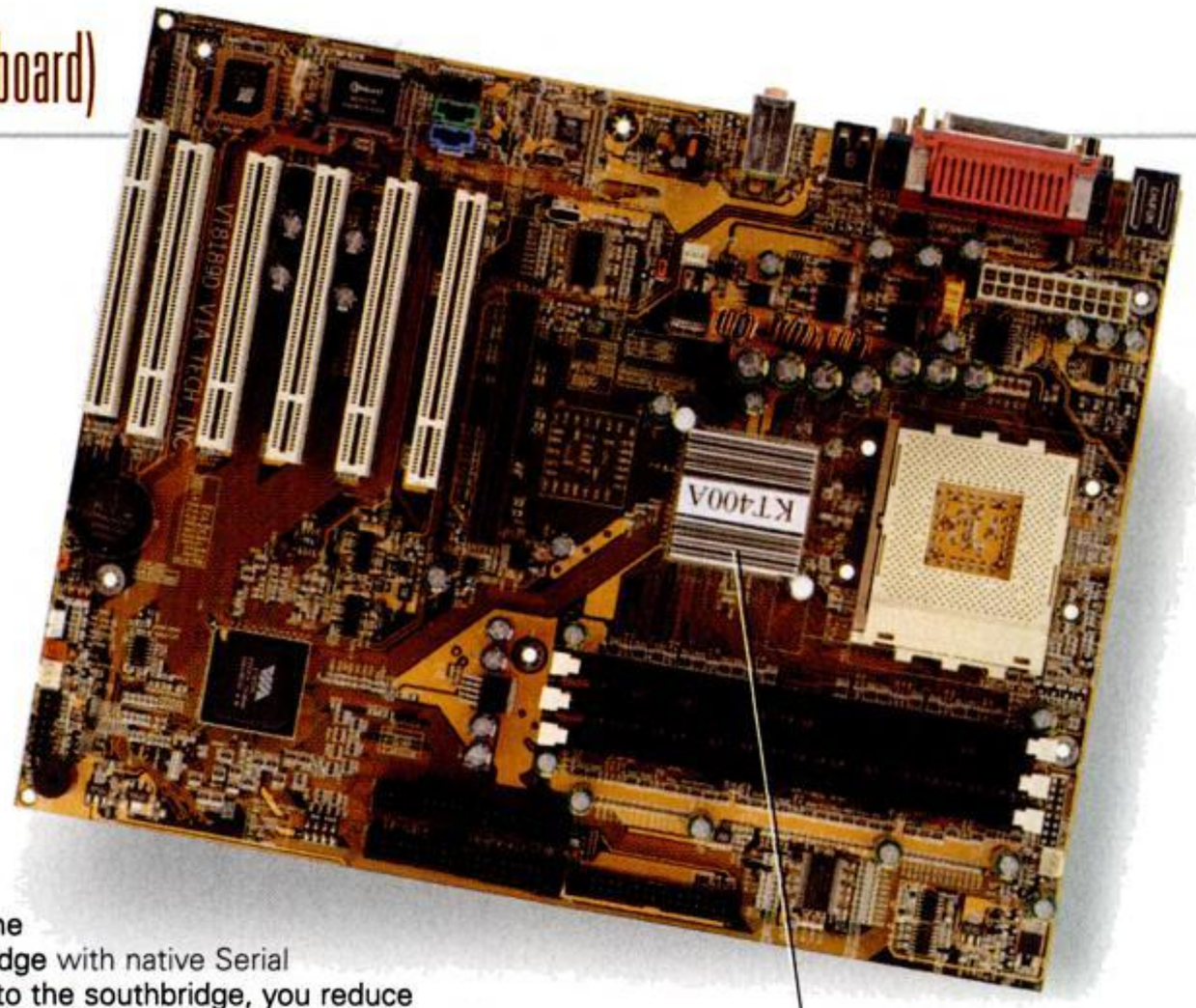
KT400A (in a VIA reference board)



Namesmanship: VIA might be new to the namesmanship game (ah, sweet innocence), but it's no naive bumpkin. What were once merely "4-in-1 chipset drivers" are now "Hyperion 4-in-1 drivers." The newly optimized memory controller is called FastStream64 Technology, and other 400A features are called DualMax, CoolAmp, and V-Link. Still, nVidia has the edge in spitting out more high-tech-sounding feature names than just about any company save Intel. **Winner: the people at nVidia**

Southbridge: VIA says that with the VT8237, it beat everyone to the punch by introducing the first southbridge with native Serial ATA support. By bringing Serial ATA into the southbridge, you reduce latency issues and eliminate interference with other data traffic on the PCI bus. But unfortunately, the board we received for testing has the *older* VT8235 southbridge chip, and it doesn't look like initial KT400A motherboards will use the newer VT8237. We do like the VT8237's most interesting features (USB 2.0, SATA and Parallel ATA), but we give the nForce2's MCP-T southbridge a slight edge because of its dual-Ethernet (albeit non-Gigabit) and FireWire support. **Winner: nForce2**

Performance: VIA unleashed its top engineers to dig into the KT400 core. Their mission was to nip and tuck latencies, increase core speed by adding deeper buffers, and improve pre-fetch algorithms. The sum of this work is the KT400A, and the new chipset almost reaches parity with its target competitor, the nForce2. VIA says the two chips are equals; our numbers show the nForce2 to be just a tad faster. But just a tad, so if you have a compelling personal reason to go with VIA, you should do so without regret. We give the edge to nForce2, but the margin is so slim, we have to pay attention to VIA's argument that dual-channel DDR is overkill memory for the Athlon XP. **Winner: nForce2 (by a hair)**

Design wins: No contest—VIA already owns more than 50 percent of the AMD market. Plus, the KT400A, despite any performance losses to the nForce2, will likely be a hit because it is pin-compatible with the KT400. Any company already making a KT400 board can just drop in new north and south chips, throw a new sticker on the box, and start shipping. **Winner: KT400A**

DARE TO COMPARE: ATHLON XP CHIPSETS

Make	nVidia	VIA
Model	nForce2	Apollo KT400A
SYSmark2002 Overall	**263**	245
SYSmark2002 Content Creation	**324**	320
SYSmark2002 Office Productivity	**213**	187
Quake III Arena Demo 1 "Normal"	**313 fps**	305 fps
3DMark2001 SE Patched Default	15372	**15526**
3DMark2003 Default	**4712**	4686
3DMark2003 CPU	**70.5**	64.7
3DMark2003 CPU 2	**11.3**	9.6
SiSoft Sandra 2003 RAM INT	**2469**	2423
SiSoft Sandra 2003 RAM FLOAT	**2374**	2330

Bolding denotes the winner. But look at how many times each chipset's scores fell within the typical 2 to 5 percent margin of error for each test.

How we tested: For the nForce2, we used an Asus A7N8X Deluxe, and its most recent public BIOS and drivers. For the Apollo KT400A, we used Hyperion drivers provided by VIA. Both boards were outfitted with the same Athlon XP 3000+ CPU, a pair of 256MB DDR333 Corsair PC3200 DIMMs running at 333MHz speeds, a Western Digital WD1200JB, ATI Radeon 9700 Pro, and Catalyst 3.1 drivers. Windows XP Pro with Service Pack 1 was freshly installed for both tests.

Drivers: You could almost set your clock by the regularity of VIA's 4-in-1 driver updates. It seems that not a week or month goes by without an update from old faithful. Of course, some would say that so many updates aren't a good thing—that the company should have "gotten it right the first time." But for the most part, we've been happy with the 4-in-1 and its schedule. **Winner: Tie**

KT400A

The Logo: The KT400A logo might be a wee bit more "hip" if it didn't look like it came from a shareware clip art CD-ROM circa 1987. **Winner: nForce2**

THE SPECS: KT400A

AGP	4x/8x
Frontside bus	200MHz/333MHz/400MHz
Memory support	DDR200, DDR266, DDR333, DDR400 (single channel only)
North-south interconnect	533MB/s

THE UPSHOT

The nForce2 was clearly superior to the KT400, but the KT400A closes the gap to such a high degree, most people won't even bother arguing about which one reigns supreme. Amazingly, the KT400A edged the nForce2 in *3DMark2001 SE*, but then lost in *3DMark2003*. In *Quake III* at low res with the audio engine disabled, the nForce took top marks by roughly 3.5 percent.

We were also surprised that the KT400A was just a hair behind the nForce2 in the synthetic *SiSoft Sandra 2003* memory benchmark. The KT400A fell down the worse in the Office Productivity portion of *SYSmark2002*. This half of the benchmark features more disk I/O than the Content Creation half, which leads us to wonder if there's a problem with the KT400A's initial IDE drivers. We'll have to test the first production boards for KT400A to see if the benchmark performance can be replicated before we render a final opinion on the chipset. For now, it's looking very good for VIA.

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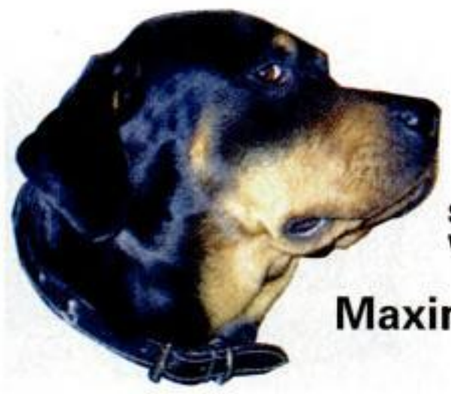


Say hello to Dee, WatchDog of the Month.

Maximum PC takes a bite out of bad gear

THIS MONTH: The WatchDog goes after...

>Bad capacitors >Minds@Work >Apple >Intuit >Lexmark

Class-Action Lawsuit Alerts

The Machiavellian copy protection scheme that Intuit implemented in the latest version of *TurboTax* has landed the company in court. A Los Angeles attorney is suing Intuit, accusing the firm of fraud as well as unfair and deceptive trade practices. The flap stems from SafeCast, which automatically installs on a user's machine as part of *Turbo Tax*. On initial builds of the app, the copy protection couldn't be removed from the machine and data was written to an unused portion of the partition table. Users accused Intuit of stealing CPU cycles and RAM. Intuit subsequently apologized and added an online update that allows consumers to uninstall the copy protection. The suit, filed by Stanbury Fishelman, Inc. of Los Angeles, also alleges that *TurboTax* will run only on machines that have a DLL required by *Internet Explorer*. For more information on the suit, contact H. Scott Leviant of Stanbury Fishelman at hsleviant@stanfish.com.

In other class-action news, a suit has been filed against Lexmark over jamming problems in many of its top-loading printers including the Z11, Z12, Z13, Z22, Z23, Z25, Z31, Z32, Z33, Z35, Z42, Z45, Z45se, Z51, Z52, Z53, Z54, Z55, Z55se, Z65, Z65p, Z65n, X63, X75, X125, 1100 Color Jetprinter, 3200 Color Jetprinter, Optra Color 40, Optra Color 40n, Optra Color 45, and Optra color 45n (*whew*).

There are also several Kodak printers included in the suit, which alleges that Lexmark knew the printers were prone to jamming but did not issue a recall and concealed potential problems from the public. For details, visit www.sheller.com/lexmarkclassaction.html.

An unknown number of capacitors with a defective electrolytic formula may be lurking in tens of thousands of motherboards, PCs, game consoles, power supplies, and monitors—anywhere the components are used.

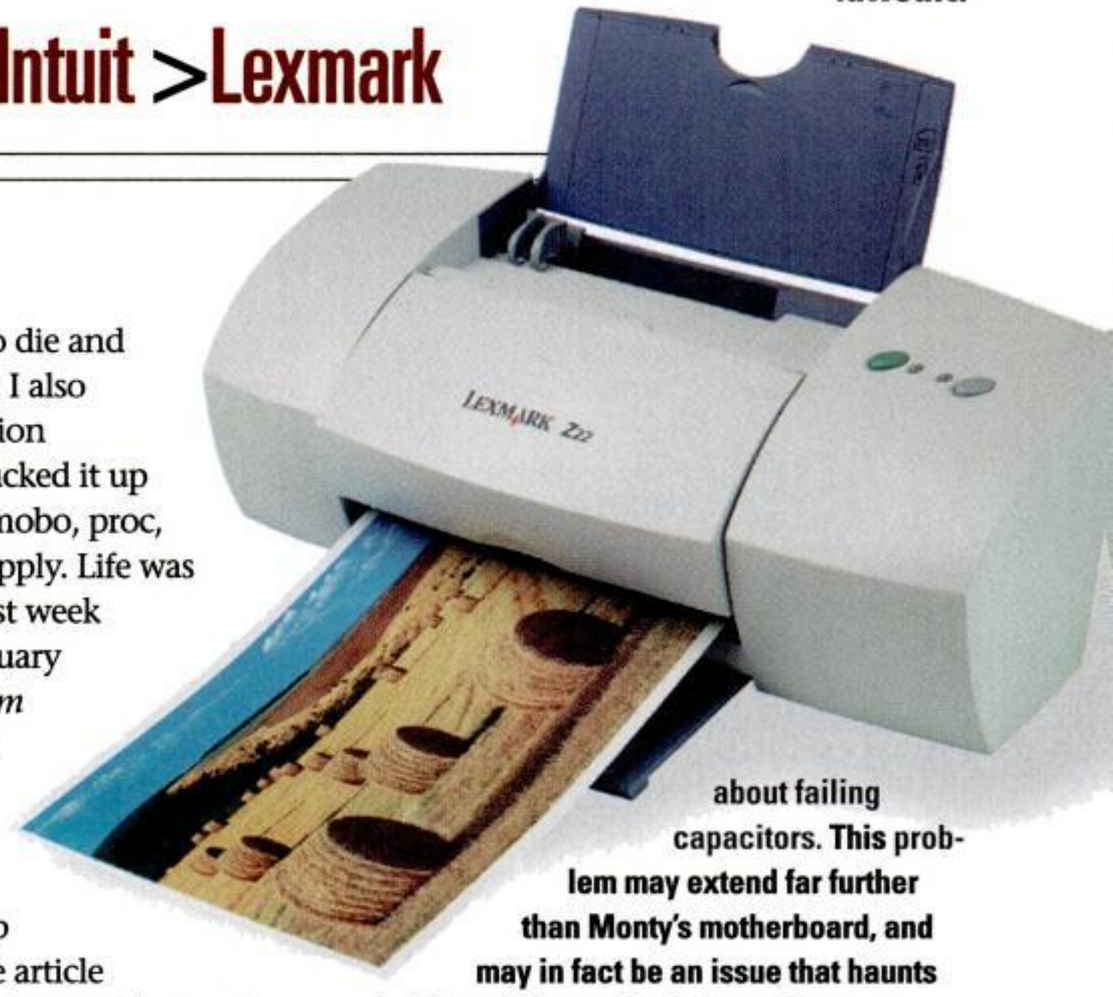
Holy Exploding Capacitors!

DEAR DOG: My Abit SA-6 mobo began randomly rebooting recently. After opening the case and looking at the motherboard, I realized that more than half the capacitors were leaking electrolyte. I tested the power supply thinking it was starting to die and found no problems. I also have surge suppression installed. Upset, I sucked it up and bought a new mobo, proc, RAM, and power supply. Life was good again, until last week when I got my February issue of *IEEE Spectrum* magazine. On page 16, I saw an interesting article titled, "Leaking Capacitors Muck Up Motherboards." The article describes massive failures with capacitors on motherboards (mostly Abit). It seems the electrolytic formula was stolen from one company and sold to another. Bottom line, the capacitors are substandard and fail prematurely. The article also says Abit will repair or replace any defective mobos. I sent an e-mail to Abit regarding this problem. As of today I have not heard back. You may want to share this with your readers.

— MONTY JANAK

THE DOG RESPONDS: **Monty was one of several readers who wrote in this month**

Many of Lexmark's top-loading printers are the subject of a recent lawsuit.



about failing capacitors. This problem may extend far further than Monty's motherboard, and may in fact be an issue that haunts the PC and electronics industry for years to come. According to news reports, an unknown number of capacitors with a defective electrolytic formula may be lurking in tens of thousands of motherboards, PCs, game consoles, power supplies, and monitors—anywhere the components are used. The origin of the problem, according to trade publication *Passive Component Industry*, is a twisted tale of industrial espionage. In a nutshell, the secret formula for the electrolytic capacitor fluid was stolen from one company and used to make low-cost components. The spies didn't make off with the entire formula, though—thus the copied electrolytes

These are examples of capacitors that are beginning to fail from a bad batch of electrolyte.

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are flawed. The capacitors reportedly fail after a year or two of use.

Carey Holzman, a system builder in Glendale, Arizona, was one of the first people who tried to bring attention to the problem. Holzman told the Dog he first discovered the problem after a customer brought in a system that would work with a GeForce3 but not a GeForce4 or GeForce2 MX. The customer used the GeForce3 card, but after a few months it completely died. Holzman then noticed the bad capacitors. Usually blown caps indicate a low-quality power supply, but Holzman has since seen dozens and dozens of failed motherboards and systems in his shop—everything from old Slot 1 boards to current-generation Socket 478 and Socket A systems. Holzman said that since he's gone public, he's heard from more than 70 people who have experienced similar problems. He suspects that the bad caps get overlooked because people don't check for them initially.

"It's so easy to see if you know what to look for," Holzman said. He recommends that you get a good flashlight, crack open your case, and take a close look at your caps. If they appear bulged at the bottom or have a bit of rust or tar-colored goo on them, they're likely leaking and about to fail. Images of blown capacitors can be seen on his site: www.careyholzman.com.

Is this a tempest in a teapot or a time bomb waiting to go off? The Dog wants to hear from you if you've had capacitor problems with your motherboard. You'll see updates on this issue as the Dog learns more.

Minds Not Working

DEAR DOG: I was thinking about buying a MindStor from Minds@Work to transfer files from my digital camera while I'm out taking pictures. It sounds like a great idea to use a hard drive to transfer digital pictures to instead of having to buy a lot of CompactFlash. My problem is that I can't reach anyone at the company, although the web site seems to function fine. There are a lot of units for sale, but I don't want one if the company's gone out of business.

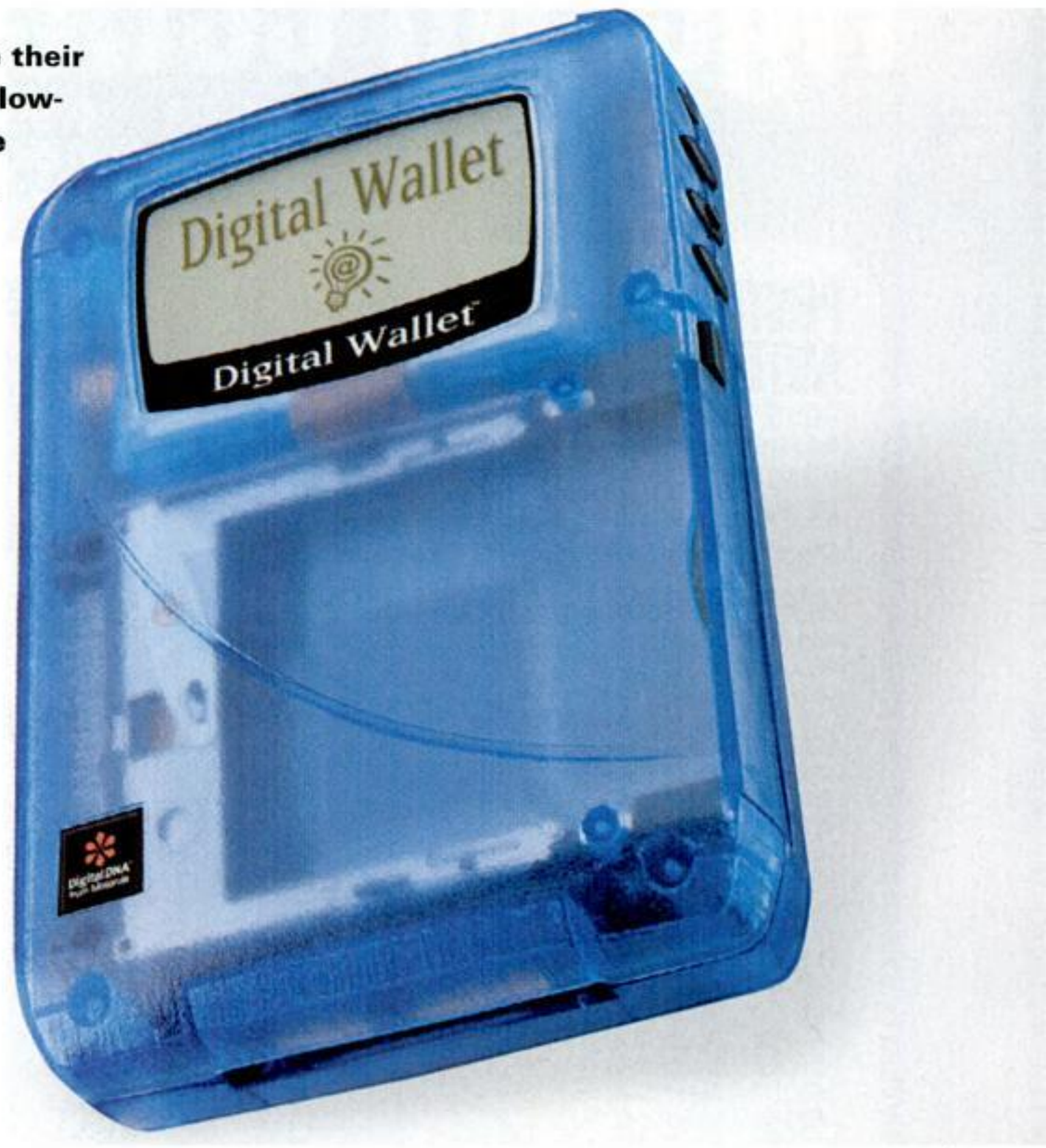
—W. WONG

THE DOG RESPONDS: You should probably spend your cash elsewhere because it looks like Minds@Work is ready to be tagged and bagged. Although the web site was still functioning at press time, phone numbers at the company's headquarters have been disconnected. The Dog reached the former president of the company, Marc Ganouna, who said the company's fate was sealed by the events of the last two years. "We are basically a victim of the economy," Ganouna told the Dog. "Our second round of financing was expected after 9/11." With many of the Minds@Work investors located in NYC, the money just didn't come through and sales evaporated with the downturn. The company dragged on until this January when the final remaining employees were laid off. Ganouna said the assets were turned over to the creditors and the doors were shuttered.

Ganouna said he wasn't sure what the creditors would do with the company and its assets. Ganouna, who created the first Digital Wallet and subsequent MindStor, said Minds@Work pioneered the idea but was unable to compete with similar devices from overseas. The idea itself is great for serious digital photographers. Instead of buying a ton of flash memory, a single memory card could be periodically downloaded into a Walkman-size device holding a 10GB, or 30GB hard drive. Not everyone was happy, though. A perusal of digital photography forums such as Dpreview.com found some users complaining about quality-control issues with the units.

With Minds@Work dead it's unlikely consumers can obtain new firmware, replacement batteries, or repairs. The Dog recommends that unless you get it for such a great price that you can't say no, it's better to buy a different product. Woof. ■

Not all good ideas work out. Despite their utility, the Digital Wallet and its follow-up, the MindStor, tanked when the company went down.



"We are basically the victim of the economy. Our second round of financing of was expected after 9/11."

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing **watchdog@maximumpc.com**. The Dog promises 5to get to as many letters as possible, but only has four paws to work with.

SORT OF A RECALL ALERT

Apple Case Mods

If your new Power Mac G4 tower is too loud, you may want to take Apple up on a "free" upgrade designed to cut the acoustic signature. Apple began offering the exchange program after the howls of its users became as loud as the howls coming from the Power Mac G4 towers. It seems that some Apple users just can't take the noise from the systems. The exchange kit includes an Allen wrench, a replacement system fan, a lower-wattage power supply (from the stock 400 watt unit to a 360 watt unit), and a 23-page instruction booklet on how to swap out the fan and power supply. Those instructions should be followed closely: Apple accepts no responsibility if parts are fried in the process of performing the exchange. Users who are too timid to swap out the components on their own may take their G4s to a service center—however, they will be charged for the labor costs

The exchange program is only valid until June 30, 2003, and applies only to Macs with a mirrored drive door, not the QuickSilver version. More info is available at https://depot.info.apple.com/generic/.

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30 STEPS TO PC PERFECTION

Better. Stronger. Faster. Here's our lab-tested regimen for turning raw PCs into pristine power boxes.

Your first few hours with a new PC are like your first few weeks with a brand-new car. Before you can really start to have fun with the beast—before you can really push it to the full extent of its capabilities—you have to perform some important break-in exercises.

For a new car, this means setting the best seating and mirror positions. Getting familiar with weight distribution, brake feel, and power delivery. Selecting your favorite radio stations. Maybe even adding some stickier tires. And, of course, putting enough miles on your engine before you can safely punch it to redline.

A newly built or purchased PC demands just as much attention. As far as *Maximum PC* is concerned, a power box hasn't achieved "PC perfection" until it's gone through a specific training program that our editors have adopted over years of system building and OEM testing.

Unless you've bought an overclocked, pre-tweaked rig from a boutique vendor, your PC's potential probably hasn't yet been realized. And even if you *did* buy a top-notch specialty PC or built one yourself, you might still be unaware of some valuable break-in and configuration tips.

We thus give you our list of the first 30 actions we take on all new PCs. Our regimen is designed to increase performance and reliability, and make Windows just plain easier to live with. Most of the tips can be effectively applied to any PC—those built by OEMs, those built by enthusiasts, and even old ones that have been running for months on end. We're dealing specifically with Windows XP boxes, but users of older Microsoft OSes should find some helpful tips as well.

And at the end of this article, you'll find a checklist to help you keep track of which tips you've implemented, as well as a handy, pullout reference sheet for your most vital PC information. You'll be able to stash away in one location all the hardware and software serial numbers, dial-up information, and network settings that you collect throughout your PC's lifetime. At some point, you'll want quick access to all this info, especially if you mirror your "perfect" system configuration, which we highly recommend during the course of this article.

We've highlighted the tips that we think are for experts only. Remember, all systems are different, and what works on one could be anathema to another.

Now, let's tweak our way to perfection...

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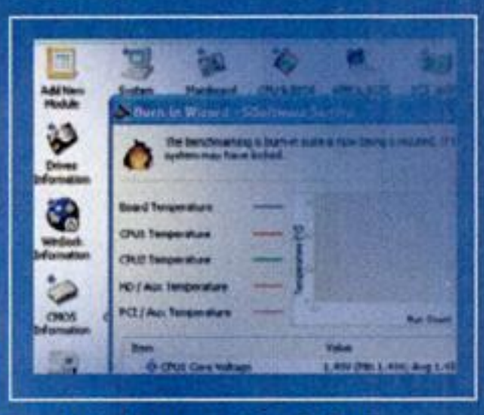
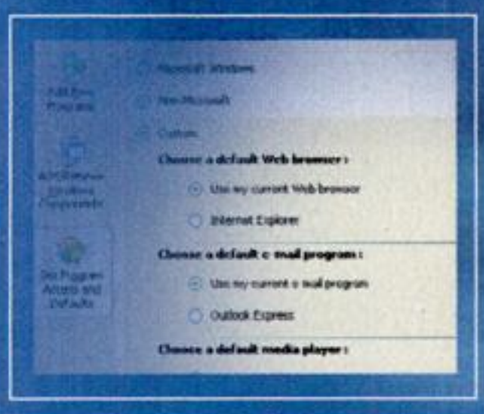
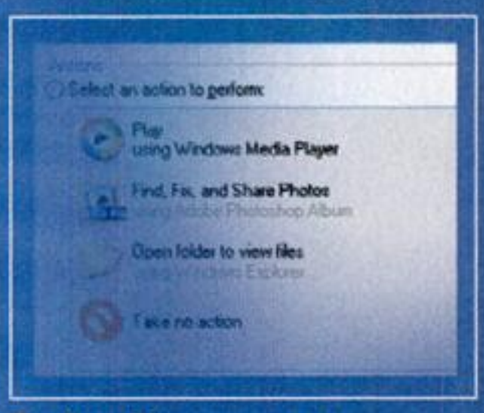
INSIDE



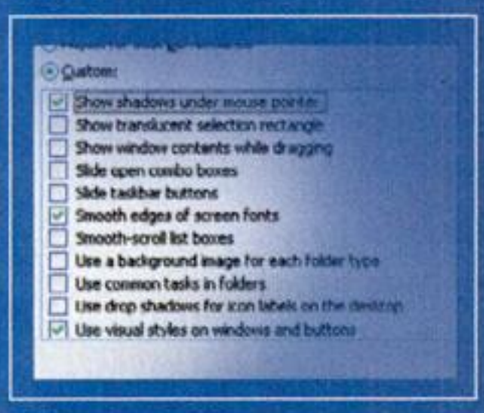
Feel the burn with *SiSoft Sandra*—page 26



Tame WinXP's default applications—page 31



Do AutoPlay your way—page 32



Make the GUI less gooey—page 36

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1 Check IDE Settings

WHY: You want the fastest data transfers possible from your hardware. But in order to get them, you're going to need to do a little planning beforehand. There's really only one thing you need to know: The ATA (IDE) interface doesn't transfer as quickly between two drives on the same channel as it does between two drives placed on different channels. With any luck, your PC manufacturer already took this into account, thoughtfully placing your optical and hard drives in the optimum positions. But don't just blindly trust your vendor. Pop open the hood, and see for yourself.

HOW: Check the jumper settings on the back of each drive—note that in order to tell whether each device is assigned as a master or slave, you may have to remove the entire drive and look at the master/slave jumper assignment illustration. It should be on the top of your hard drive, but sometimes you have to resort to checking the documentation. If you didn't get drive documentation, you'll find this information on the web site of your hard-drive manufacturer.

The following is a profile of our ideal setup. It pairs the drives we use the most—the primary hard drive and the CD-RW—with less-often-used drives:

POWER REQ: 5/12V 700/800mA
Jumper Configuration Table:
PK CS DS KEY
Master
Slave (Jumper Parking Position)
Cable Select for Master/Slave
(Factory default)
WARNING: REMOVAL OF ANY LABEL, COVER OR TOP SCREWS VOIDS WARRANTY

Almost all contemporary drives have a chart on the body of the drive that indicates the proper jumper settings for master, slave, or cable select. "Cable select" was a well-intentioned idea that never took off, so don't worry about that one.

- PRIMARY MASTER: Main hard drive (our fastest hard drive also plays host to our OS)
- PRIMARY SLAVE: DVD-ROM
- SECONDARY MASTER: CD-RW or recordable DVD
- SECONDARY SLAVE: 2nd hard drive

2 GIVE YOUR SYSTEM A FIGHTING CHANCE

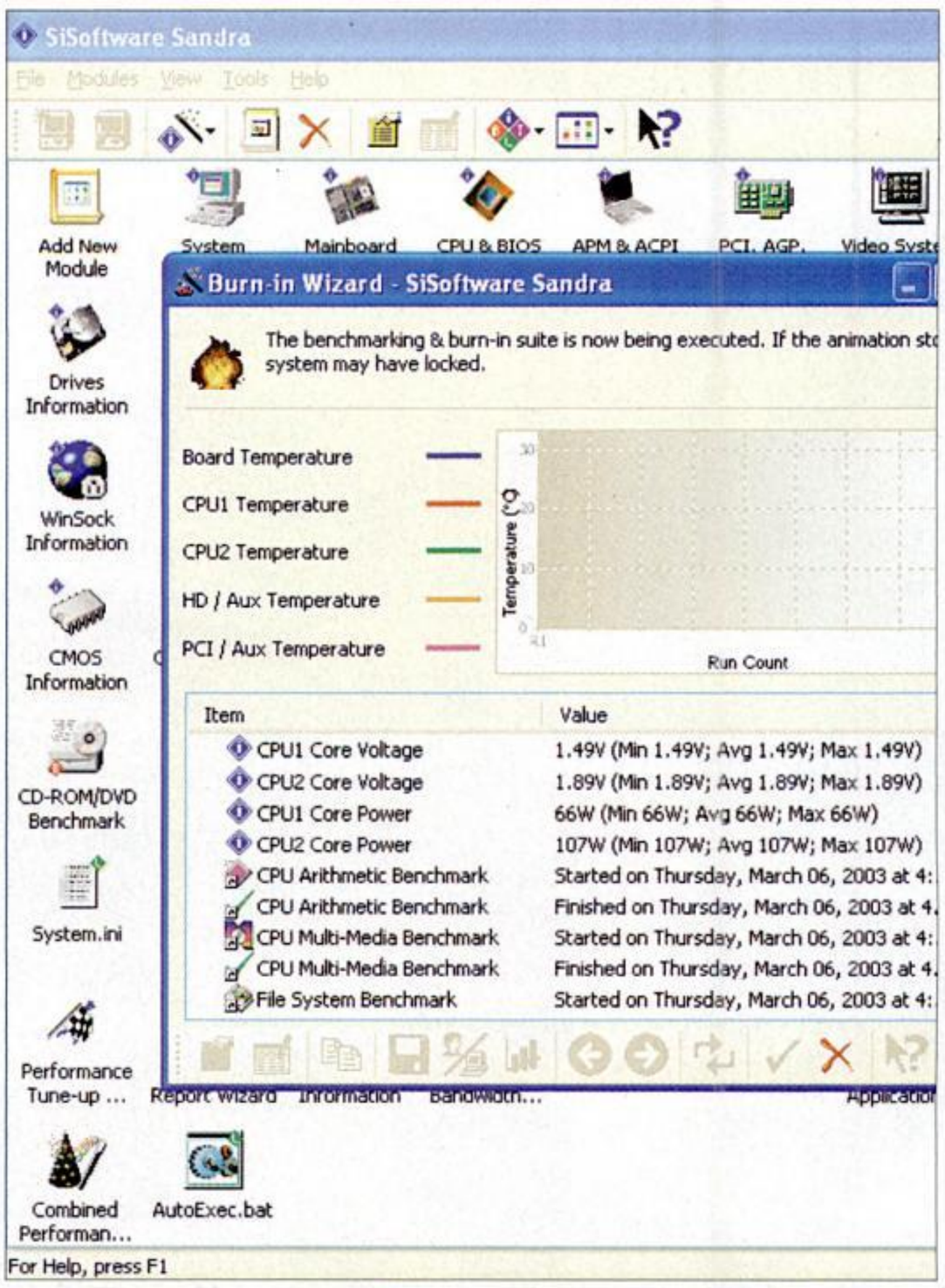
WHY: WinXP may be Microsoft's best OS effort ever, but only if you have enough RAM. Too many PCs ship with a minimum of RAM. Granted, RAM isn't that cheap, but if Windows has to resort to using your hard drive as virtual memory, your performance is going to go down the tubes. The lesson: Don't starve the OS of system memory.

HOW: We recommend 256MB as the bare minimum. Sure, Microsoft says 64MB is the minimum, and that you need 128MB to turn on everything, but we say splurge. A 256MB stick of DDR memory goes for about $40 these days. Go to the store and pick up a stick or two.

3 Burn-In Your System with SiSoft Sandra

WHY: Computer chips are kind of like potato chips, in that there are bound to be a few bad ones in every bag. The problem is, a bad CPU may work fine at first, and only collapse later under stress. By that time, you've probably put hours of setup and configuration into your new baby. That's why one of the first things you should do after receiving a new PC is "burn-in" your system for a few hours, taxing every component to see if any bad apples will expose themselves.

HOW: Grab the free version of *SiSoft Sandra* off our disc, or at www.sisoftware.net. After you install and launch *Sandra,* you'll get a choice of which subsystems you want to put to the stress-test. *Sandra* will then place a heavy workload on these systems and continually loop instructions for as long as you want it to. If your machine can survive an overnight run, you're in great shape, but a five or six hour period should suffice..



***Sandra* stress-tests your PC components by subjecting them to heavy loads for hours on end.**

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4 Update Your BIOS

WHY: If "flashing your BIOS" sounds dirty to you, please skip this tip. It's essentially the same thing as upgrading the firmware of any other component, but if anything goes wrong during this update, you could completely hose your motherboard, which would prevent you from booting your PC. BIOS flashing may be the most dangerous procedure in this guide, *so think once, think twice, replacing a mobo is not very nice.* If you want to go for it, you can benefit from bug-fixes, improved hardware support, and an overall faster and more stable system.

HOW: When you boot your PC, look at the top of the screen—you should see your BIOS name and revision number. You may have to boot several times in order to write down all the information. If you get a manufacturer boot logo, just press Escape immediately after it pops up. If you know how to get into your BIOS (usually by pressing the Del or F1 key upon booting), then your BIOS name and rev will be displayed there, as well. Once you've got it, you can check two places for updates. If you bought your system from a retailer, check the retailer's site first. If you don't find anything there, or if you built your own PC, try the motherboard manufacturer's site next. Do a search on BIOS updates within the site, and *make sure* to match up your specific BIOS revision number with the one on the manufacturer's web site. You'll also need to download their flashing utility. Note that these utilities sometimes demand a floppy disk drive. We don't like that, but that's life.

5 Tweak Your BIOS

WHY: Many people shy away from BIOS tweaks. Maybe that's because messing with the part of your PC that acts as the mediator between the operating system and the motherboard can prevent a new PC from booting. Or maybe it's because a BIOS tweak that works wonders in one PC may cause constant blue screens in another.

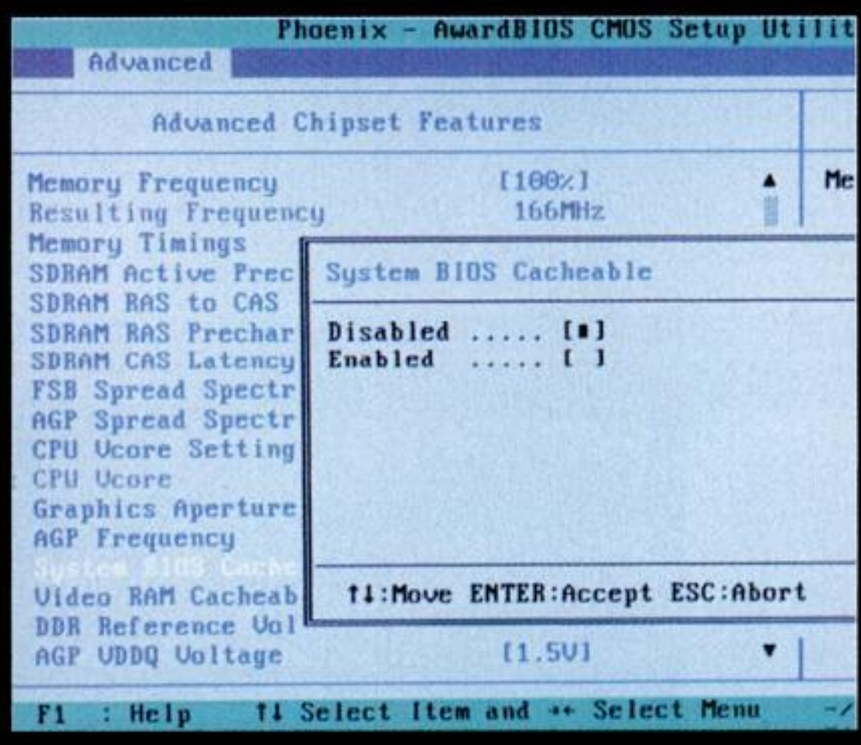
C'mon, where's your sense of adventure, people?

While we can't give you a template that will fit every system or motherboard—no one could—we can point out a few settings that usually get set incorrectly by PC resellers, or even by motherboard manufacturers. Changing these settings is highly unlikely to prevent your PC from booting, but you should still abide by the Golden Rule of BIOS Tweakage: Use your system for a couple hours in between each tweak to determine if it's introducing any system instabilities. If you do every tweak all at once, you have no way of knowing which one borked your system.

HOW: Most motherboards let you enter the BIOS by prompting you to hit F1, F2, or DEL during the initial boot-up sequence. If you have a company logo that pops up before your OS starts and you never see a prompt to enter the BIOS, try powering down the computer. When you turn it back on, hit the Esc key a few times in the first four or five seconds during boot-up. Sometimes this will make the logo screen go away, revealing the prompt to enter the BIOS.

Once you're in the BIOS, you'll see a few menu options. Most of the options you're interested in are usually under Advanced Chipset Features. Inside you'll typically find the four settings we'll be talking about. Use the cursor key to navigate to the option you want to change. Most BIOSes will tell you how to change the fields at the bottom of the screen, but the procedure usually involves hitting plus or minus, page up or page down, or just hitting Enter in the field. Save your changes and exit. OK, ready?

- System BIOS Cacheable: *Set to Disabled.* BIOS-caching copies the BIOS to a portion of the L2 cache in your CPU. Yeah, that's right, the extremely valuable and small bit of L2 cache in your chip. Since modern OSes usually don't access the BIOS, it's a waste of valuable space. There is also a small risk that a rogue program may overwrite the portion of cache and destabilize your PC. In general, leave this setting disabled.
- Video BIOS Cacheable: *Set to Disabled.* This setting copies the video BIOS to L2 and, just like the "System BIOS Cacheable" setting, eats up precious space. In general, there's more performance to be gained by freeing up the L2 cache.
- Video RAM Cacheable: *Set to Disabled.* Here's yet another legacy tweak that eats up valuable L2 cache real estate.
- AGP Aperture Size: *Set to 128MB.* The AGP aperture size allocates a memory range that can be used by the accelerated graphics port to store textures (map data or vertex data in games). The old rule of thumb was to set this field to one half of system memory. But with main memory pushing 512MB or 1GB, that's overkill. Either leave it at the default setting, or select 64MB or 128MB. We've found very little impact from the default setting, but for today's games, 128MB is the place to be.



Some motherboards still default to settings that don't make sense today, such as caching the system BIOS in L2 cache.

6 Update Chipset Drivers

WHY: If you installed Windows XP or ME, but didn't bother to load chipset drivers for your motherboard, you could be losing performance or stability—maybe a lot of it. Core-logic chipset drivers, much like the drivers for your videocard or soundcard, allow your operating system to communicate directly with your hardware. Windows XP (and ME to an extent) has a library of generic drivers for much of the world's hardware, but it's likely that those drivers don't take full advantage of your hardware, or are horribly out of date. For maximum performance and stability, we strongly recommended that you install your mobo's most recent chipset drivers so the OS knows exactly what it can do with your hardware.

HOW: Visit your motherboard vendor's web site, or the web site of the manufacturer that produced the core-logic chipset, to see if driver updates are available. Generally, the big motherboard web sites, such as www.asus.com and www.soyousa.com, have the chipset drivers appropriate to the boards they sell. But more often, you can get the most up-to-date drivers directly from the chipset maker. The only catch is that these newer driver builds may not have been tested and qualified by your motherboard maker.

For most motherboards that use Intel chipsets, hit www.intel.com and search for chipset drivers or INF updates. For boards using VIA chipsets, www.viaarena.com is the place to download the latest so-called 4-in-1 drivers. At at www.nvidia.com, you can find the latest drivers for the nForce and nForce2 chipsets.

Simply download the correct drivers for your motherboard and install them. But, again, you should respect the fact that the drivers on your mobo vendor's site may be more appropriate than newer drivers posted on your chispet maker's site. We've seen driver updates increase performance, but we've seen performance decreases as well. Sometimes, driver updates will add important stability and reliability features at the expense of a bit of speed. This is usually to cover a boo-boo in hardware that can't be fixed.

7 Convert Your Drives to NTFS

WHY: At *Maximum PC*, we're proponents of the NTFS file system. It's more reliable than FAT32, and it includes per-user security and quota settings, and automatic encryption. You lose a wee bit of speed when you shift to NTFS from FAT32, but we think having a more robust file system is worth a small performance hit.

HOW: Changing your FAT32 hard drive to NTFS is super-easy, but don't take it lightly. There's a small chance that the conversion process will completely destroy all the data on your hard drive, so you should *definitely back up your hard drive before you attempt the conversion!* Once you've done that, all you need to do is open a command prompt (press the Windows key and R) and type `convert x: /fs:ntfs` where "x" is the letter of the drive you want to convert. The next time you reboot, Windows will convert your drive to NTFS.

8 Create a Special Partition for Personal Documents

WHY: Because your personal documents (term papers, love letters, vacation photos) can't easily be replaced, they're the most valuable resources on your hard drive. So it makes sense to place them away from the "common areas" of the OS, where a hard drive write error or system crash could make you lose more than just your patience.

HOW: Ideally, you should create a separate partition for coveted docs using FDISK or the Windows XP installation routine before you install Windows XP. But if you don't want to reinstall Windows, use a nondestructive partition utility such as PowerQuest's *PartitionMagic* to carve out some space for your valuables. Create enough room for at least one complete drive image, and anything else not backed up to another medium. Better yet, if you've got more than one drive, place your documents on the drive that doesn't play host to your OS.

9 PATCH YOUR PC

WHY: There are really three kinds of Windows Updates for your WinXP installation. "Critical updates" fix both security holes (that could allow someone to wreak havoc on your PC) and coding blunders (that disable all or part of the operating system if certain circumstances are met). Simple "Windows XP" updates include bug-fixes, updates for Windows components, and other OS enhancements. Finally, there are driver updates, which can vastly improve the performance and stability of your hardware under Windows XP. Unfortunately, many of these updates—particularly the critical ones—require a reboot, and it's likely you'll have to go back to Windows Update three times before you've gathered all the newest files.

HOW: Just go to Start > Programs > Windows Update. Install the critical updates first, then go back after you've rebooted to install the driver updates, and then go back once more to add any other enhancements. It's worth the trouble, and it beats having to do all the scouring for updates on your own.

10 UPDATE YOUR DRIVERS

WHY: You might think your trip to Windows Update solves this problem for you, but it doesn't. Windows Update only pushes drivers that have been WHQL (Windows Hardware Quality Labs) certified. Many manufacturers, for one reason or another, take a pass on WHQL certification, and you'll get a warning message from WinXP when you try to install uncertified drivers.

Here at *Maximum PC*, we know that we can always use WinXP's System Restore feature to roll back to an earlier point if we install unstable drivers or drivers that conflict with other drivers. So we always seek out the latest drivers for our hardware, WHQL certified or not.

11 Put All Your Downloads in a Single Place

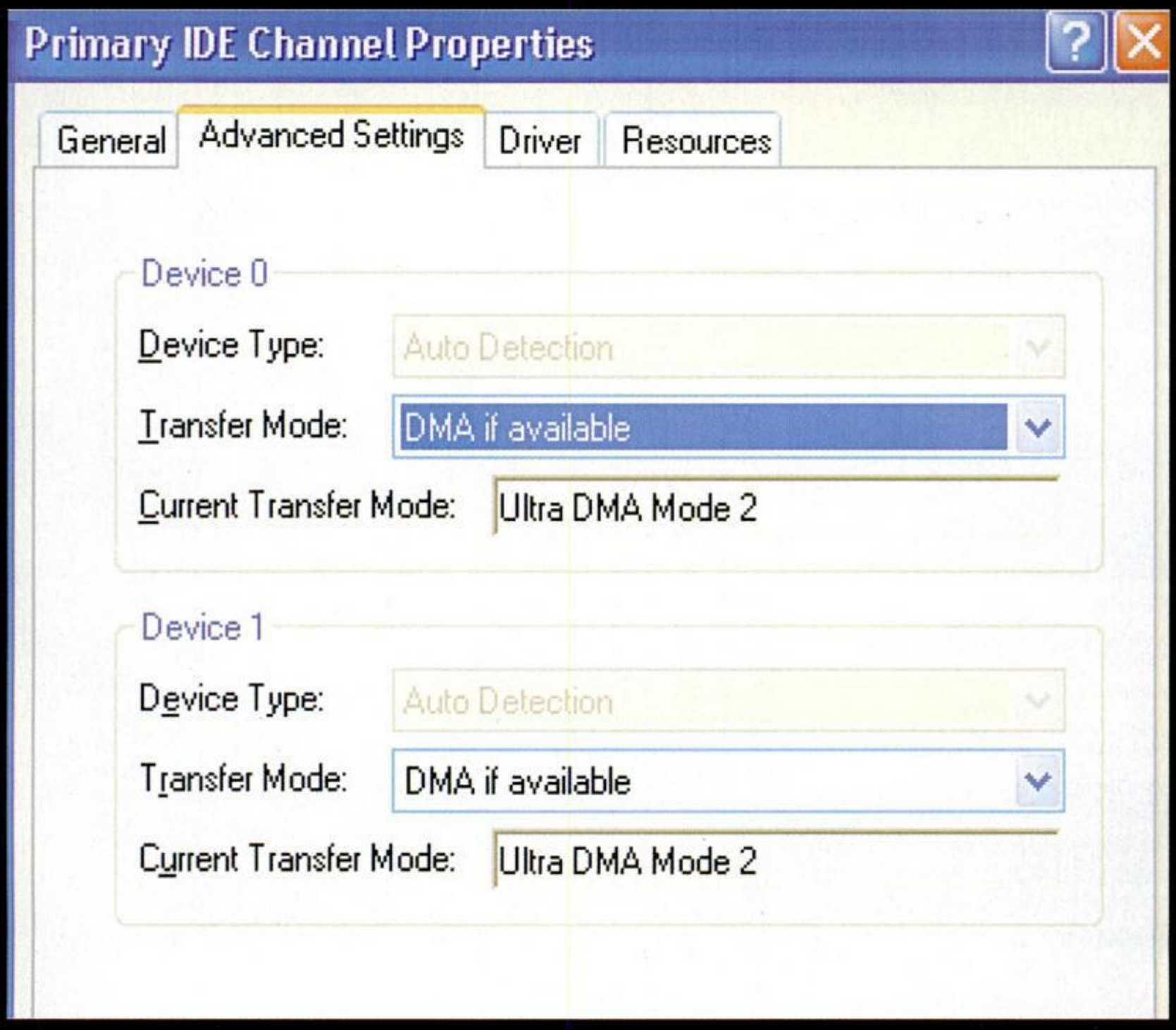
WHY: This is otherwise known as "putting all your eggs in one basket." It's something you typically shouldn't do, but we'll issue an exemption just this once. The idea is to put everything you've downloaded during a PC rehabilitation process—drivers, firmware, software updates, shareware, utilities, everything—in a centralized location. It's the "single toolbox" concept; everything is right where you need it, right when you need it.

HOW: Make a folder and call it "downloads" or "toolbox" or something to that effect. It helps to make separate folders for the categories indicated above, and nested within those, separate folders for your different drivers. We recommend keeping this folder away from My Documents. Why bother backing up all these extra files that will be outdated in a few months anyway?

12 Toggle on DMA for Your Drives

WHY: You really shouldn't have to do this, and most of the time, you'll find that your DMA (direct memory access) mode is indeed set correctly. But if it isn't, you'll experience excruciatingly slow performance from your hard drives and opticals.

HOW: Right-click My Computer, and select Properties. Click the Hardware tab, then click Device Manager. Click on IDE ATA/ATAPI controllers. Now click the Primary IDE Channel, and select the Advanced Settings tab. The Current Transfer Mode for both devices should be set to DMA if available. If it says PIO Only, change it using the pull-down menu.

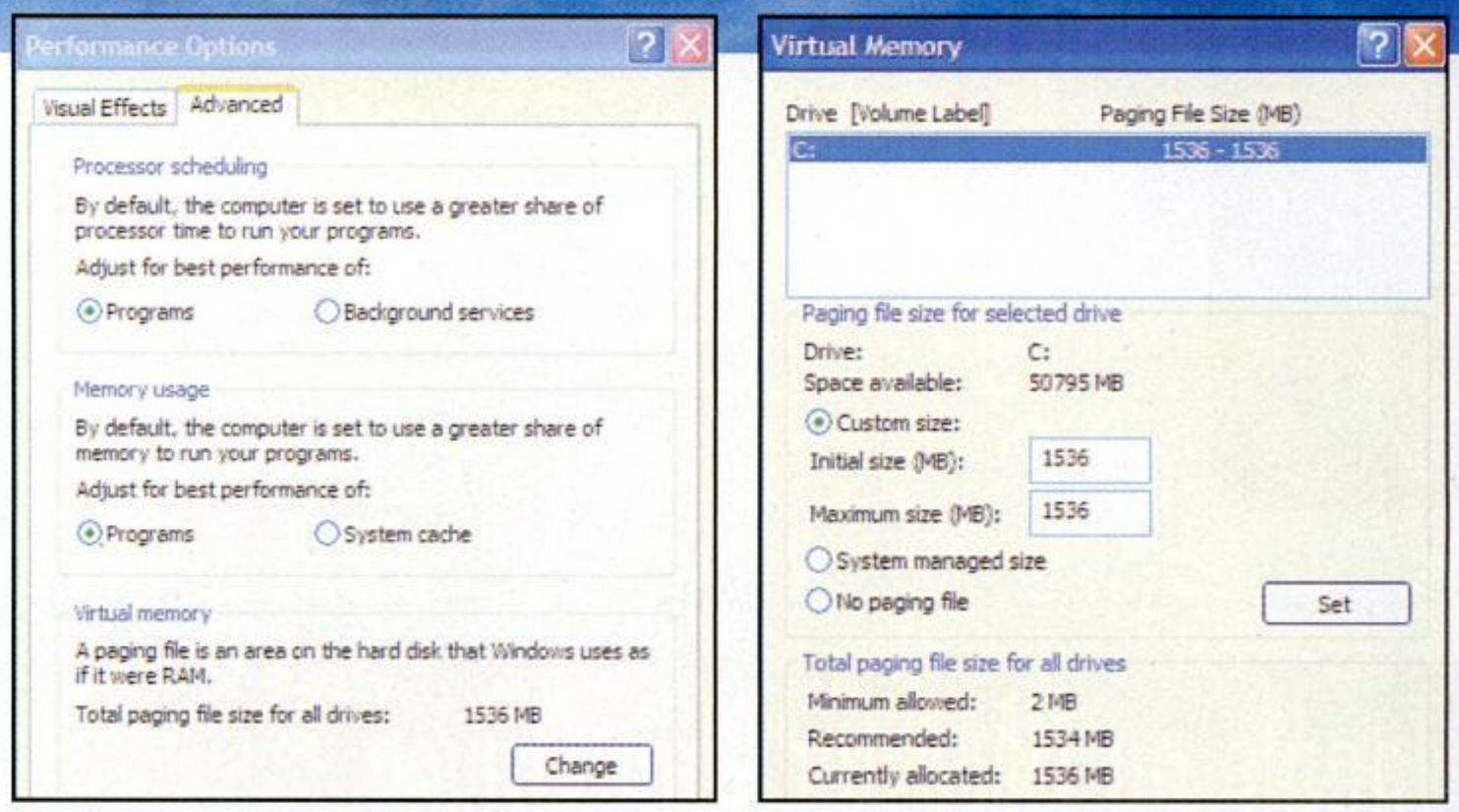


If your hard drive or optical drive doesn't support DMA (direct memory access), boy is it time to get a new drive.

13 Create a Static Swap File

WHY: When your PC's main system memory is fully taxed—because, for example, you have 20 high-res images open, but only 256MB of RAM—your operating system will save temporary data on your hard drive in what's known as a "swap file." The swap file is essentially virtual memory. It performs the same function as system memory, but is much, much slower.

By default, your swap file can change its size as necessary. This was a good idea when hard drives had tiny capacities, but with today's 100GB hard drives, there's no reason to sacrifice performance for the sake of a couple megabytes. So instead of relying on a dynamic swap file that's constantly being resized, you can cut down on a lot of hard drive thrashing by switching to a fixed size. And it's best to do this ASAP.


Performance Options
Visual Effects
Advanced
Processor scheduling
By default, the computer is set to use a greater share of processor time to run your programs.
Adjust for best performance of:
Programs
Background services
Memory usage
By default, the computer is set to use a greater share of memory to run your programs.
Adjust for best performance of:
Programs
System cache
Virtual memory
A paging file is an area on the hard disk that Windows uses as if it were RAM.
Total paging file size for all drives: 1536 MB
Change
Virtual Memory
Drive [Volume Label]
Paging File Size (MB)
C: 1536 - 1536
Paging file size for selected drive
Drive: C:
Space available: 50795 MB
Custom size:
Initial size (MB): 1536
Maximum size (MB): 1536
System managed size
No paging file
Set
Total paging file size for all drives
Minimum allowed: 2 MB
Recommended: 1534 MB
Currently allocated: 1536 MB

Making your swap file static can save your system from endless disk thrashing and gnashing.

HOW: First, go to System Properties (press the Windows key and Pause/Break), select the Advanced tab, then click the Performance Settings button. In the new window, go to the Advanced tab, then click the Change button. To create a static swap file, you can change to the custom size setting, then change both the Initial size and Maximum size to the same value.

If you have more than a gigabyte of RAM, set your swap file size to 1.5 times the amount of RAM you have. If you have between 256MB and 1GB, set it to two times the amount of RAM you have. If you're running less than 256MB of RAM, we recommend you let Windows manage your swap file for you.

Once you've made your swap file static, you need to defragment it. The best way to defragment your swap file is to use a third-party defragger's "boot time" mode. Once your PC boots into Windows, it's not able to rearrange these files. Our favorite third-party defrag utility is Executive Software's *Diskeeper* (yes, just one "k") at www.executive.com. It does a great job of defragging the Windows swap file.

14 UNINSTALL UNINVITED APPS

WHY: Rare is the new PC that doesn't arrive loaded with dreary apps you'll never use, offers for online services you'll never touch, and loads of stinky shovelware. In a best-case scenario, all this debris is taking up space on your hard drive. In a worst-case scenario, craplets running in the background could slow down your PC and cause system instabilities. Get rid of all this space junk.

HOW: Your first stop is Control Panel > Add or Remove Programs. Go down the list and start weeding out stuff you'll never use. Next stop is Add/Remove Windows Components in the same menu. Slice and dice with extreme prejudice. If you're not sure what it does, it's probably best to leave it alone, but remember that these components can be added later using this same control panel applet.

If you're lucky, some mysterious apps will let you know where they came from if "Click here for support information" is indicated below the name of the app.

15 Lighten the Background Load

WHY: Even though you just ditched preinstalled applications you don't want on your PC, there may still be utilities and processes you don't need hanging out in the background wasting CPU cycles.

HOW: Go to Start Menu > Run, and enter "msconfig" (with no quote marks) in the dialog box. Click the Startup tab. Here you'll find a list of items that load themselves into memory when Windows boots up. All you have to do is uncheck the box next to the app, and it won't load the next time. The entry will remain, however, in case you want to re-activate it later.

Unfortunately, many of these startup apps have cryptic names reminiscent of DOSville—these names offer few hints as to how crucial the apps are to keeping your hardware and software working correctly. If you're stumped, here's a tip: Go to www.pacs-portal.co.uk/startup_content.htm. There you'll find a *huge* database of startup program names, and a description of what they do.

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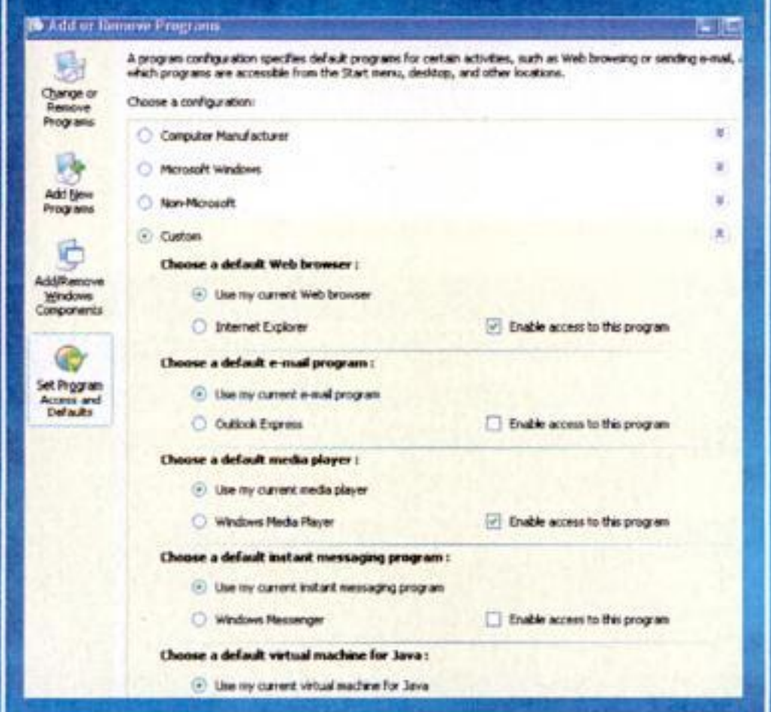
16 CUSTOMIZE YOUR DEFAULT APPS

WHY: Who should be in charge of what programs automatically launch when you send an e-mail or read a Usenet post—you or Microsoft? The office of the Attorney General thinks it ought to be you, so that's why you'll see the option to Set Program Access and Defaults in the Add or Remove Programs dialog. Unfortunately, this Windows function also has one of the most bizarre and confusing interfaces ever to come out of Redmond. Here's the step-by-step on cutting Windows components out of the picture.

HOW: Let's say you want to switch your default web browser to *Mozilla*. First, launch *Mozilla*, and set it as your default browser. You must do this *first*. Now, go to Start > Control Panel > Add or Remove Programs, and select Set Program Access and Defaults. Click on the Custom radio button. Unbelievably, it's the only button that will lead you to a screen where you can actually change anything!

Now, under Choose a default Web browser, select Use My Current Web Browser. Of course, you'll have to repeat this tedious process for e-mail, media playback, instant messaging, and to choose your Java machine.


Add or Remove Programs
A program configuration specifies default programs for certain activities, such as Web browsing or sending e-mail, and which programs are accessible from the Start menu, desktop, and other locations.
Change or Remove Programs
Add New Programs
Add/Remove Windows Components
Set Program Access and Defaults
Choose a configuration:
Computer Manufacturer
Microsoft Windows
Non-Microsoft
Custom
Choose a default Web browser:
Use my current Web browser
Internet Explorer
Enable access to this program
Choose a default e-mail program:
Use my current e-mail program
Outlook Express
Enable access to this program
Choose a default media player:
Use my current media player
Windows Media Player
Enable access to this program
Choose a default instant messaging program:
Use my current instant messaging program
Windows Messenger
Enable access to this program
Choose a default virtual machine for Java:
Use my current virtual machine for Java

When you're establishing which apps are launched by WinXP as default applications, the only screen you need to deal with is the one you get after clicking the Custom radio button.

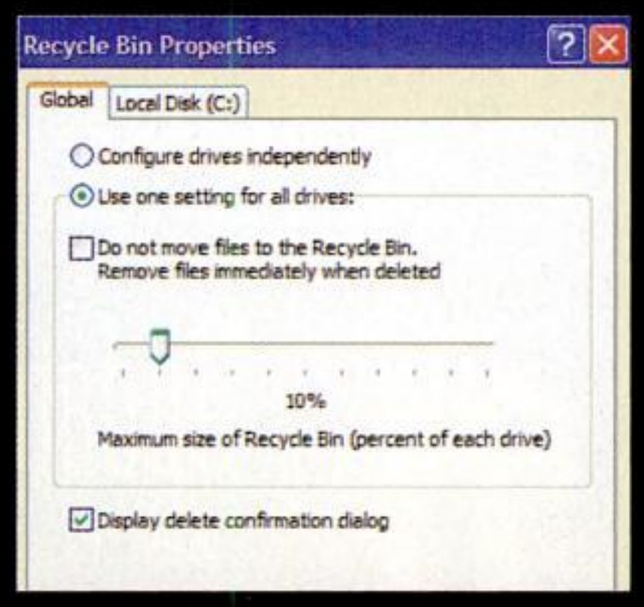
17 Reclaim Wasted Space

WHY: Lots of the default settings in Windows assume you have what would be a tiny hard drive by today's standards. For example, when the Recycle Bin made its first appearance, a 1GB hard drive was *huge*. Allotting 10 percent, or 100MB, of available space for the Recycle Bin didn't seem so weird, because who had 900MB of crap with which to fill the rest of the drive anyway? These days, however, some of the default percentages allocated to system resources by Windows XP just don't make sense when you're talking about 100GB and 200GB hard drives.

HOW: It's easy to ferret out space wasters. Start by right-clicking the Recycle Bin and going to Properties. Now change the default maximum size of the Recycle Bin from 10 percent to a more reasonable setting—probably 1 to 2 percent, depending on your drive's size.

Next cruise to System Properties by pressing the Windows key and Pause/Break on your keyboard. Go to the System Restore tab, and adjust your setting. For power-user's, we recommend moving the slider to the lowest setting, but do not allocate less than 500MB of space. So, for example, on a 75GB drive, the lowest setting leaves us with only 200MB of System Restore overhead—that's not enough. The one percent setting, however, allocates a little over one gigabyte. That's just slightly more than we'd like, but it'll do. That's more than enough space for a month or two of save points, and space isn't wasted on restore points we'll never need.

Finally you can free up a little more space by adjusting your *Internet Explorer* cache. Start *IE*, then go to Tools > Options. In the General tab, click Settings (under Temporary Internet Files), and then adjust the slider to change the amount of disk space used. We think a 200MB cache is more than enough for most users.


Recycle Bin Properties
Global
Local Disk (C:)
Configure drives independently
Use one setting for all drives:
Do not move files to the Recycle Bin. Remove files immediately when deleted
10%
Maximum size of Recycle Bin (percent of each drive)
Display delete confirmation dialog

The Recycle Bin was first coded about eight years ago, when 1GB hard drives were top-shelf. We recommend changing the space reserved for deleted files to something less extravagant than 10 percent.

18 Install Bread-and-Butter Utilities

Right after you build or buy a new PC, you should immediately install the most essential utilities you use every day. These utilities have already established their worth, and you'll be glad to have quick access to them from the get-go. Just don't forget to register them before you image your drive! Also, don't forget to update as newer versions become available (especially if you're accustomed to using our "Clean Start" reinstall method).

Here's a list of the utilities that *Maximum PC* editors can't live without (you can find all of them on this month's disc):

- *ACDSee*. An image viewer with customizable views and fast thumbnail generation. **www.acdsystems.com**
- *WinZip*. The classic decompression utility; much better than XP's rudimentary squeezer. **www.winzip.com**
- *Zone Alarm*. Even the free version offers great firewall protection and convenient tagging of "trusted" remote PCs and networks. **www.zonelabs.com**
- *Norton Antivirus*. If you don't already know why you need antivirus protection, you're sure to find out very, very soon. **www.symantec.com**
- Ad-aware. A free, spyware-busting utility that's updated frequently. **www.lavasoft.com**
- *Pop-up Stopper*. A free version of this handy surfing shield is available, but the commercial versions squash pop-unders, too. **www.popupstopper.com**

19 ESTABLISH A BACKUP DIAL-UP CONNECTION

WHY: Once you get broadband service, you'll want to promptly remove your modem and chuck it out the window. Don't. Not only would you be facing a lawsuit from the person who you clocked on the head, you'll also have no way to get online if your broadband goes down.

HOW: Most broadband resellers do offer a free dial-up connection. If you're not sure about your provider, call and ask. And if your ISP *doesn't* offer this service, you're not out of luck. BAMnet (www.bamnet.com) offers a unique, pay-per-use dial-up service. All you have to do is sign up at the web site. There's no monthly fee, the service doesn't require you to install a single bit of software, and you'll get an 800 number to log in with. If you select the pre-paid plan, it's only 4.5 cents a minute. For the pay-as-you-go service, it's still a reasonable 6.5 cents. Not bad, if all you want to do is download e-mail, and then go offline.

20 Set Up Your Folder Structure

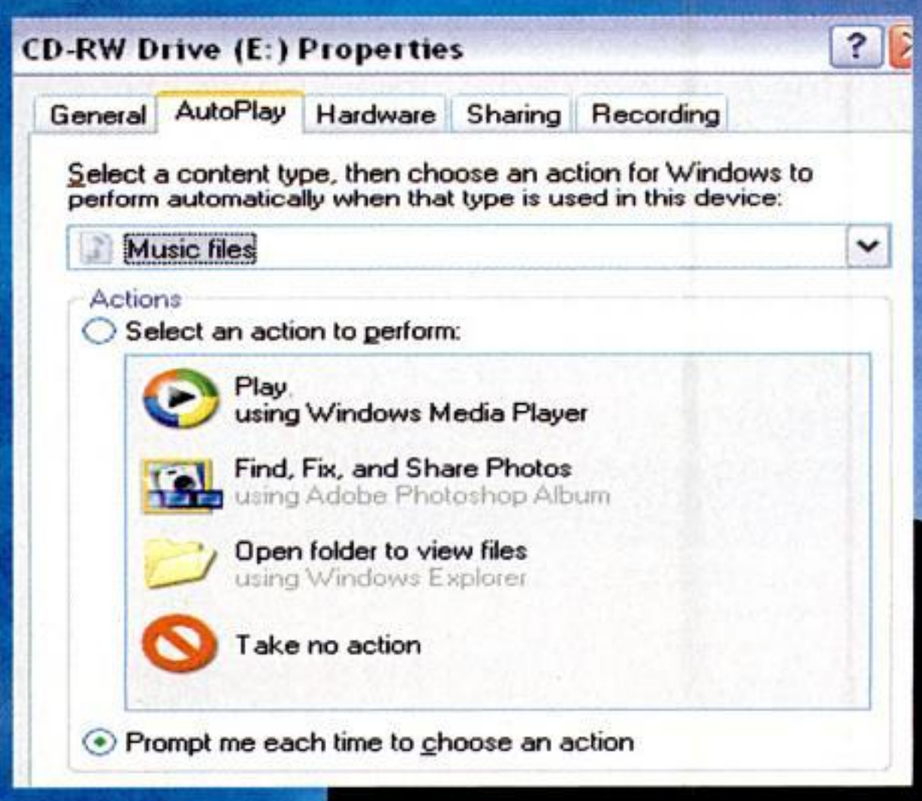
WHY: Do yourself a big favor, and create a sensible folder structure from day one. Do it before you start working, begin playing games, or even image your drive. Why? Because folder structures that are built with logic and order are much easier to work with than structures that organically grow—and grow and grow and grow—during the chaos of day-to-day computing. You'll want to choose (or create) readily recognizable, easily accessed folders for image files, MP3s, videos, text documents, downloaded executables, drivers, and so on.

HOW: Sometimes it's easiest to simply give in to Microsoft's own vision of folder organization, so you might want to create all your data folders in My Documents, where applications will default to when saving. And don't forget to back up your data frequently. Just grab your entire My Documents folder and dump it into a safer place.

21 Update Your Firmware

WHY: We're not crazy about the word "firmware" because it suggests software that'll never need to be updated. But the fact remains that updating your firmware is the closest you can get to a hardware upgrade without actually buying new hardware. New firmware—device controller software stored on a microchip—can fix bugs, improve performance, and even add completely new features to your components. So it pays to add the latest firmware to your newly minted PC. Check your component manufacturers' web sites at least once a quarter for firmware updates, especially for optical drives and digital gadgets.

HOW: Updating firmware involves a tricky process called "flashing." Although it's not all that complicated, if anything goes wrong during flashing, you could render your hardware kaput. Each hardware manufacturer uses its own flashing process, *so follow the instructions slowly, carefully, and to the letter.* Don't skip ahead, and don't go off on your own.



The pull-down menu in WinXP's AutoPlay dialog allows you to choose how Windows responds when you drop in a music CD, blank CD, data CD, DVD, or mixed-mode disc.

22 CUSTOMIZE YOUR AUTOPLAY SETTINGS

WHY: WinXP tries very hard to please. Sometimes, too hard. Thus we have AutoPlay, which is intended to make life easier by automatically playing audio CDs, opening up an image viewer when a Photo CD is dropped in, and so on. This can be a convenient feature—unless you swap CDs in and out all day like we do. Then, it's just annoying. Here's how to customize it.

HOW: Open Explorer, and right-click on your optical drive. Select Properties, and then select the AutoPlay tab. Using the pull-down menu, select a content type, and then use the "Select an action to perform" radio button to indicate how you want WinXP to handle that kind of disc. Repeat for the remaining five content types and for each optical drive in your PC.

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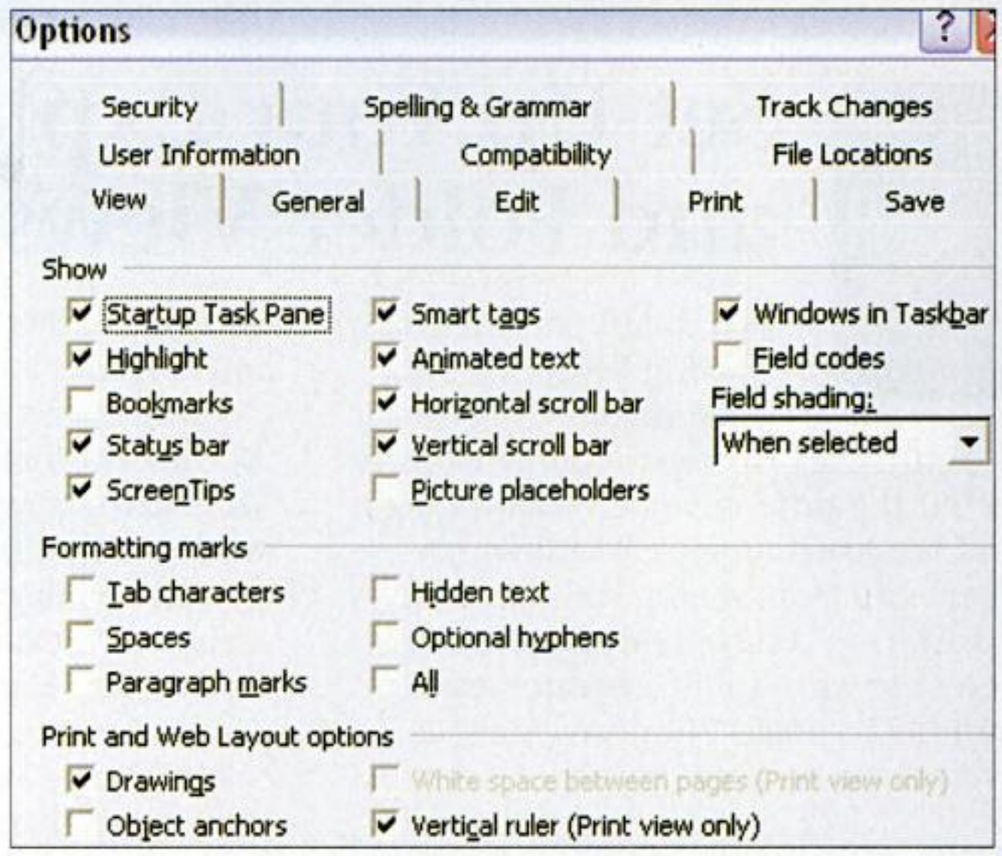
23 Configure Application-Specific Settings

WHY: We hate this part. Going into all our apps, setting up default save folders, window views, preferences—what a drag. That's why we do it as soon as we build new systems, before we image our drives. If anything goes wrong with our partition, we can simply wipe it away and start fresh, without having to re-enter all our specific app settings.

HOW: Most application preferences can be found under the File menu, the Edit menu, and sometimes under a Tools or Options menu.



24 ORGANIZE START MENU

WHY: If you've been running your system for more than a couple months, odds are it's an absolute mess. You probably install dozens of shareware apps, game demos, and new drivers every month, and each of those bits of code wants to steal some of your precious Start menu space. We use the Start menu throughout the day, every day, and every fraction of a second longer that it takes to navigate is a fraction of a second wasted. By grouping and categorizing your apps in the Start menu, you can make them easier to find, and also contribute to the culture of tidiness that keeps a PC feeling like new for a long time.

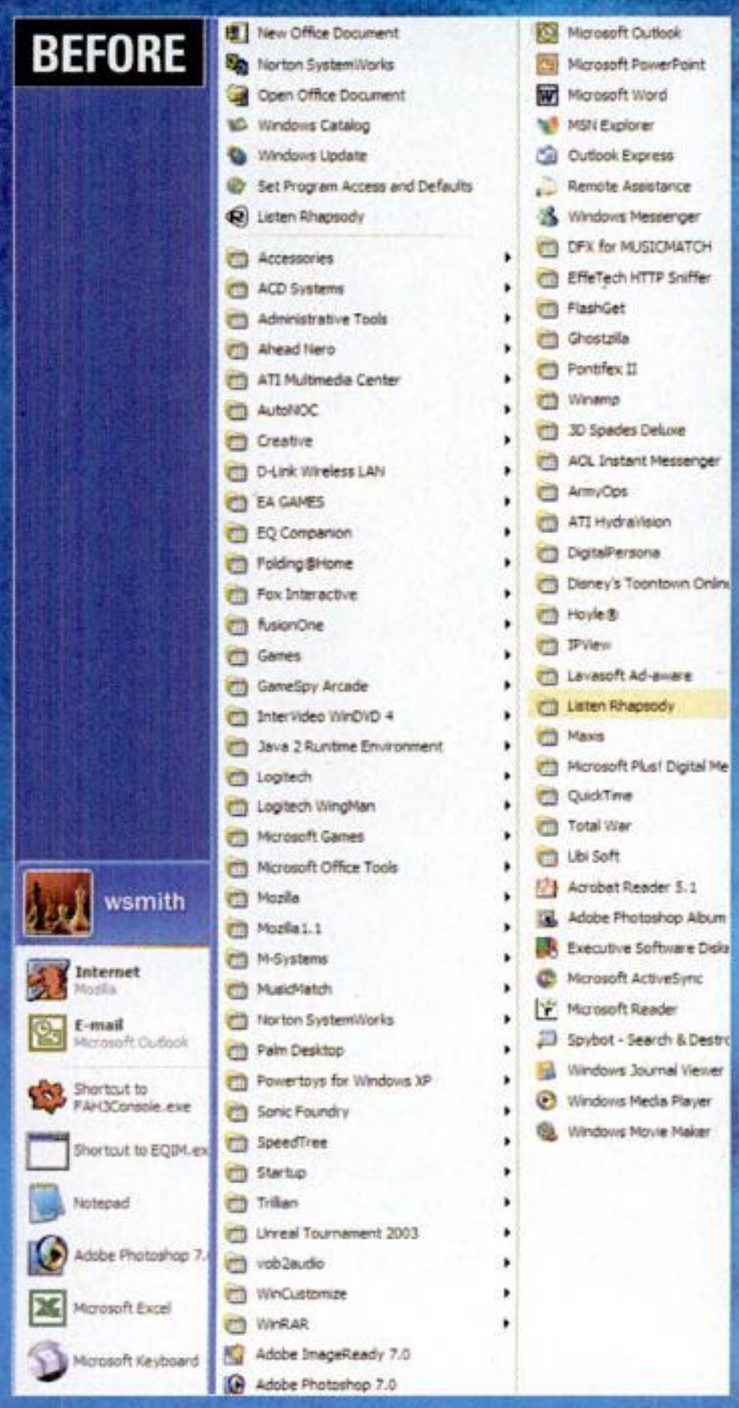
HOW: Right-click the Start menu icon, select Explore. Now right-click the Start menu again, and click Explore All Users. The first window you opened has all the shortcuts that are specific to your account. Other users on your system won't see them. The second window has the shortcuts that all users of your PC can see, so if you've got anything to hide, make sure a shortcut to it doesn't land here.

Reorganizing the Start menu from here is no different than working with any other directory structure in Explorer (except that you're working with shortcuts, not actual files or subdirectories). It's a simple matter of dragging and dropping, renaming, creating new folders, and deleting them as necessary.

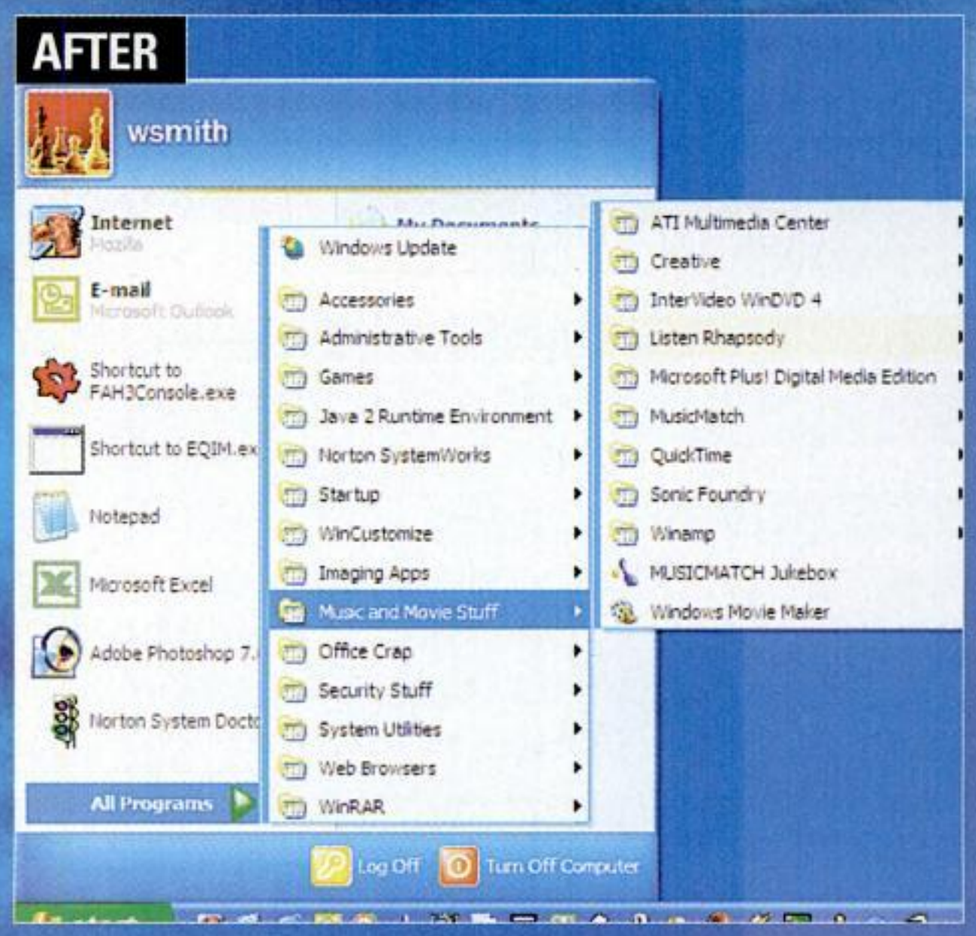
If you're aware of a couple easy rules, you can reorganize your Start menu without fear. First, if something starts in your account's Programs directory, it should probably stay there. Likewise, if a shortcut is in the directory that's available to all users, it should probably stay there. The second rule is that if you have a folder that's named the same thing in both windows (that is, your window and the All Users window), it will show up as a single folder in your Start menu. So, you can have a Games directory in both your account's profile directory and your All Users directory. Third, if you delete anything from the All Users directory, all the other users of your computer will lose access to it. Finally, if you're the only person that uses your computer, it's safe to copy all the shortcuts to the All Users directory, and just make your changes there.

Don't waste your own "CPU cycles" trying to find the programs and documents you need. If your Start menu looks like our "before" shot, follow our simple instructions and make it look like our "after" shot.

BEFORE



AFTER

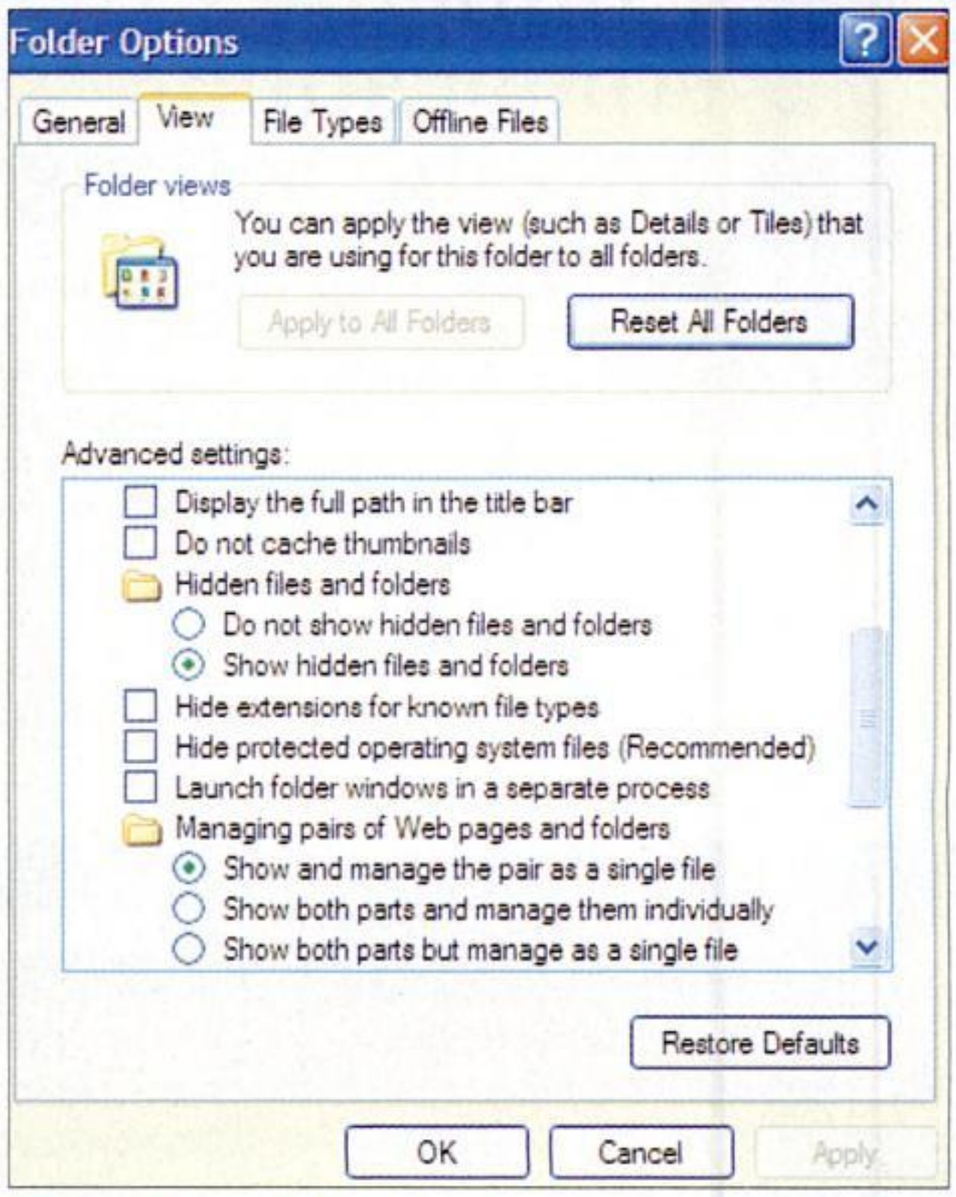


25 Set Up Your Explorer and Folder Views

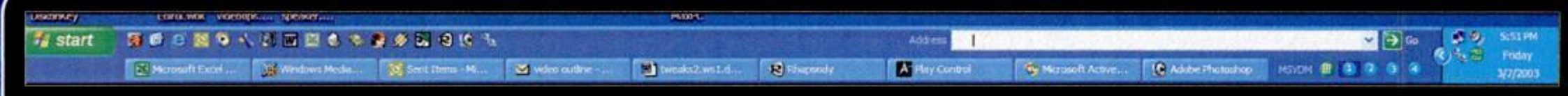
WHY: Are you tired of clicking Setup.ico on a game install CD instead of Setup.exe? How can you be expected to tell the difference between the icon and the executable if Windows prevents you from seeing the file extensions? This is newbie damage control gone haywire, so let's tweak viewing options to make Windows show us everything we want to see.

HOW: Go to the Control Panel and click Folder Options. Then click the View tab, and switch "Do not show hidden files and folders" to "Show hidden files and folders." Now uncheck the "Hide extensions for known file types" box. Finally, if you're confident in your knowledge of what is and isn't safe to mess with in Windows, you can uncheck the "Hide protected operating system files (Recommended)" setting. Now hidden and system files will show up in Explorer.

Next, open a folder—My Documents, for instance—and set it up the way you like information to be displayed. Do you prefer bulky, easy-to-see icons, or a list view with details on each file? Experiment with the View menu, and if you select "Details," like we do, don't forget that you can customize the information provided in the Details view (and even the order it's provided in) by selecting "Choose Details" a little lower in the same menu. Now, if you want to extend this same folder format to *all* your folders, just go to Tools > Folder Options, select the View tab, and click Apply to All Folders.


Folder Options
General
View
File Types
Offline Files
Folder views
You can apply the view (such as Details or Tiles) that you are using for this folder to all folders.
Apply to All Folders
Reset All Folders
Advanced settings:
Display the full path in the title bar
Do not cache thumbnails
Hidden files and folders
Do not show hidden files and folders
Show hidden files and folders
Hide extensions for known file types
Hide protected operating system files (Recommended)
Launch folder windows in a separate process
Managing pairs of Web pages and folders
Show and manage the pair as a single file
Show both parts and manage them individually
Show both parts but manage as a single file
Restore Defaults
OK
Cancel
Apply

Can't find a file? If it's marked to be hidden by the file system, it just doesn't show up.



26 Handy Taskbar Tweaks Save Time (and Memory)

The Quick Launch bar is better than the System Tray for storing shortcuts to apps.

WHY: The Quick Launch toolbar is an unheralded time saver. Not only does it provide fast access to your favorite apps, but apps that might run in the background waiting to help (and taking up valuable system resources) can be moved over to Quick Launch where they can be launched whenever you need them.

HOW: Right-click your Taskbar, click Toolbars, and click Quick Launch. Now you'll see a new area to the right of your Start button; it's probably got shortcut icons for *Internet Explorer*, *Outlook Express*, and a couple other things. Now you can dump any shortcuts—even document shortcuts!—into the Quick Launch area. In step 15, you removed background apps you didn't want running all the time. You may want to place shortcuts to some of these apps for easy access in the Quick Launch area. They'll still be accessible, but not running all the time.

Once you've gotten the Quick Launch menu and Taskbar rearranged to your liking, you can right-click the Taskbar and Lock the Taskbar to prevent accidental clicks from messing up your positioning.

CLEAR WINXP REMINDERS

27

WHY: The first time you boot a new PC, or reinstall WinXP, you get hammered with demands to activate Windows, to use Windows Messenger, and to take the Windows Tour. You even get nagged about being nagged in the future to clean up your desktop! It's aggravating enough the first time—so don't go through it a second time.

HOW: Unfortunately, there's no way to turn off all these nag messages, but you should take care to follow all of their advisories *before* you image your drive. If you image your drive before "clearing" the nag messages, they'll just reappear every time you reinstall your clean image.

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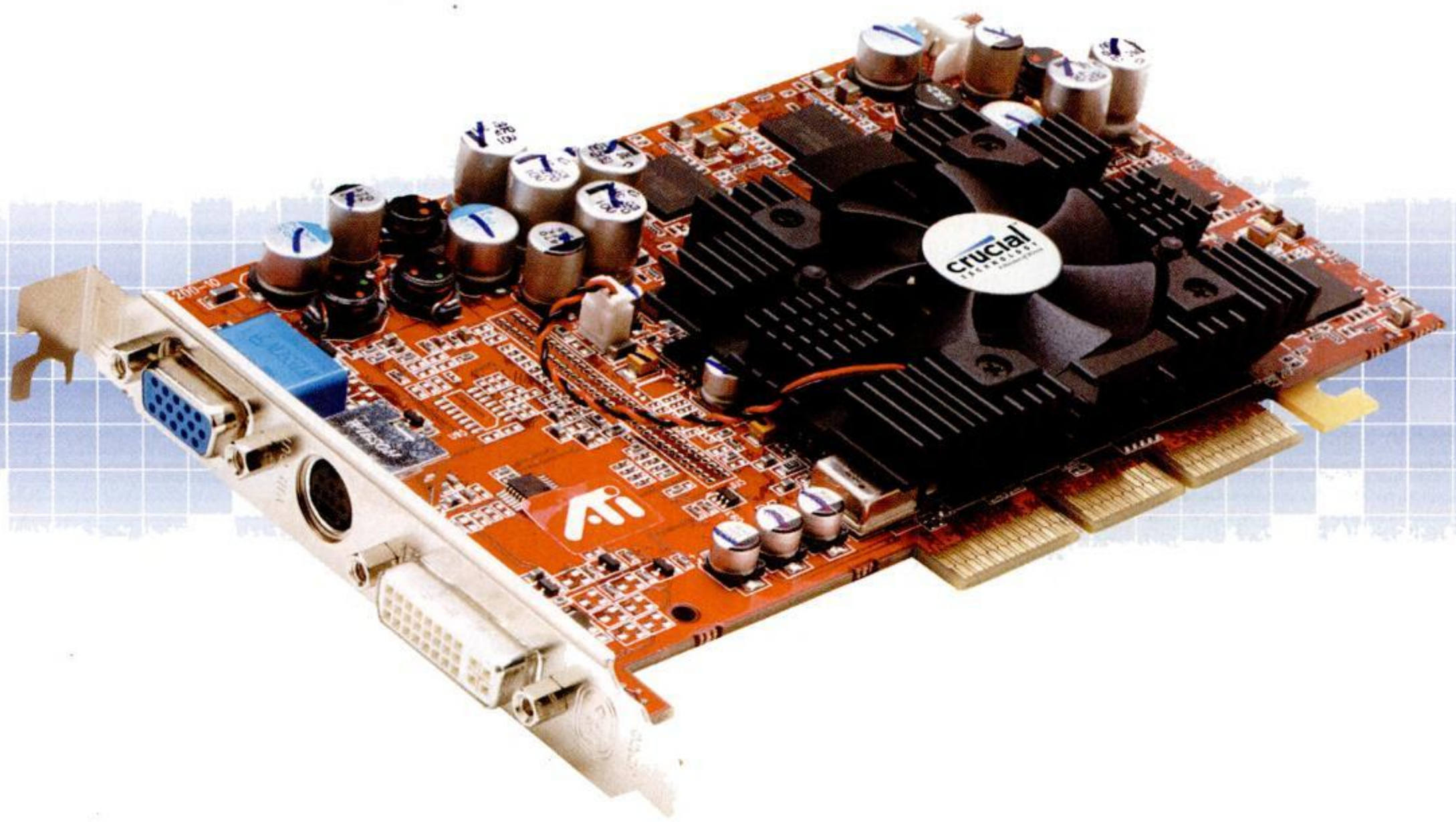
Performance. It's Crucial.



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*See Web site for details.

Prices may vary according to specific system requirements. The price listed was valid on 3/7/03 when we sent this ad to the publisher; however, prices may have dramatically increased or decreased since then. Visit the FAQ section of Crucial.com to learn more about why memory prices go up and down.

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The Maximum PC Circuit Course

Build a better, stronger, faster machine in 30 steps. Make sure you complete and check off the entire training regimen.

- [ ] 1. Check IDE Settings
- [ ] 2. Give Your System a Fighting Chance
- [ ] 3. Burn-in Your System with SiSoft Sandra
- [ ] 4. Update Your BIOS
- [ ] 5. Tweak Your BIOS
- [ ] 6. Update Chipset Drivers
- [ ] 7. Convert Your Drives to NTFS
- [ ] 8. Create a Special Partition for Personal Documents
- [ ] 9. Patch Your PC
- [ ] 10. Update Your Drivers
- [ ] 11. Put All Your Downloads in a Single Place
- [ ] 12. Toggle-on DMA for Your Drives
- [ ] 13. Create a Static Swap File
- [ ] 14. Uninstall Uninvited Apps
- [ ] 15. Lighten the Background Load
- [ ] 16. Customize Your Default Apps
- [ ] 17. Reclaim Wasted Space
- [ ] 18. Install Bread-and-Butter Utilities
- [ ] 19. Establish a Backup Dial-up Connection
- [ ] 20. Set Up Your Folder Structure
- [ ] 21. Update Your Firmware
- [ ] 22. Customize Your AutoPlay settings
- [ ] 23. Configure Application-Specific Settings
- [ ] 24. Organize Your Start Menu
- [ ] 25. Set Up Your Explorer and Folder Views
- [ ] 26. Enable Taskbar Tweaks
- [ ] 27. Clear WinXP Reminders
- [ ] 28. Tame Your GUI Display
- [ ] 29. Be Selective in Your Services
- [ ] 30. Image Your Drive

Quick Reference

It pays to keep all your PC information—software serial numbers, tech support numbers, network information, etc—in a central location. Like, say, this handy clip-out reference sheet.

MY RIG

Manufacturer/model: _____

Tech support phone number: _____

WinXP Product Key: _____

DIAL-UP INFORMATION (OR PPPOE)

Dial-up phone number: _____

Username/password hint: _____

Tech support phone number: _____

SOFTWARE SERIAL NUMBERS

Name:	Serial#:

NETWORK INFORMATION

SSID: _____

IP address: _____

DNS address: _____

Subnet mask: _____

Gateway: _____

WEP Key: _____

INTEL SYSTEM BUS 800

As Intel pushes its system bus to 800MHz, it paves the way for a new era of desktop dominance—and RDRAM is visible only in the rear-view mirror. We give you the full roadmap to Intel's technology plans, along with a comprehensive tour of Pentium 4 chipsets.

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BY GORDON MAH UNG

Let there be no doubt that Intel is firmly driving desktop PC development. Sure, AMD's new "Barton" Athlon XP processor posted impressive scores when we tested it last month. Hell, we even declared the new AMD CPU to be the performance equal of the 3GHz Pentium 4—this despite a massive clock-speed disadvantage. But this month, Intel is releasing some new technologies that threaten to leave AMD sucking exhaust fumes. In fact, to say Intel is "kicking it into high gear" might be an understatement. With its latest advancements, Intel is practically adding a seventh gear to a car that never had more than six before.

Intel's first big move is a completely new dual-channel DDR400 core-logic chipset. The new 875P will be *the* chipset for Intel's high-end desktop PCs—bad news for RDRAM lovers. The second big move is the introduction of a faster system bus. Gone is the 533MHz speed limit. You can also forget about any Prius-like performance numbers in the 600MHz and 700MHz range. How does an *800MHz* high-speed autobahn suit you?

Yep, we're turning cartwheels too.

Intel's move to an 800MHz bus is indeed ambitious. Last year, the industry expected a segue to 667MHz and *then* 800MHz. But Intel scrapped that nonsense and jumped straight to the big eight-double-oh.

It's no secret that the Pentium 4 architecture thrives on memory bandwidth. Just as a muscle car needs a throaty, free-flowing exhaust system in order to get the most from its engine, the Pentium 4 needs bandwidth. This became readily apparent when Intel introduced the 845 chipset using PC133 SDRAM. A dismal performer, the 845 cut the Limburger with its meager 1GB/s of bandwidth—the slow-speed SDRAM was an unconscionable bottleneck. On the flipside, when Intel spit out the 850E chipset, which supports dual-channel PC1066 RDRAM, the Pentium 4 began to show what it's made of. Offering an asynchronous 533MHz frontside bus and 4.2GB/s of bandwidth, the 850E is still the top-performing P4 chipset.

But with the jump to 800MHz and support for dual-channel DDR400, Intel will increase its bus bandwidth to 6.4GB/s—that's *twice* the bandwidth the P4 had available when the CPU was introduced two years ago. The boatloads of bandwidth Intel is adding to its platform is impressive, but the PC industry isn't out of the traffic jam yet: Memory speed still lags far behind CPU speed.

Consider: In February 1999, Intel introduced the then-astounding 500MHz Pentium III. This CPU ran with PC100 SDRAM memory clocked at 100MHz. But since then, memory speeds have crawled while CPU clock speeds have shot through the roof. For example, the November 2002 introduction of the 3.06GHz P4 marked a five-fold increase in clock speeds since 1999. In the meantime, the clock speed of DRAM has climbed from 100MHz to roughly 400MHz (200MHz double-pumped). Not very impressive. Only after being paired with dual-channel RDRAM has the Pentium 4 been able to reach its highest performance, but we're still clearly running toward a wall.

continued on next page

Dual-Channel DDR: What It Is, and Why It's Trouble

Dual-channel technology shouldn't be confused with DDR (double data rate) technology. DDR essentially uses both the rising and falling edges of the memory clock to effectively double performance from, say, 200MHz to 400MHz. Dual-channel, meanwhile, opens up a "second lane" through which memory data can pass. So while single-channel DDR will shoot data through just a single 64-bit lane, dual-channel DDR will have two 64-bit lanes at its disposal. Dual-channel doesn't "double" your performance a la DDR technology, but it does double your potential bandwidth, and this offers significant performance dividends in memory-hungry games and apps.

The new standard in DDR memory is DDR400 (200MHz memory double-pumped to 400MHz). Intel will initially use this memory type for its 875P chipset and 800MHz bus, but no one expects DDR400 to be at the high end of Intel's road map for very long. Indeed, in the grand scheme of memory design, DDR memory is approaching the end of its natural lifespan (see sidebar, page 42).

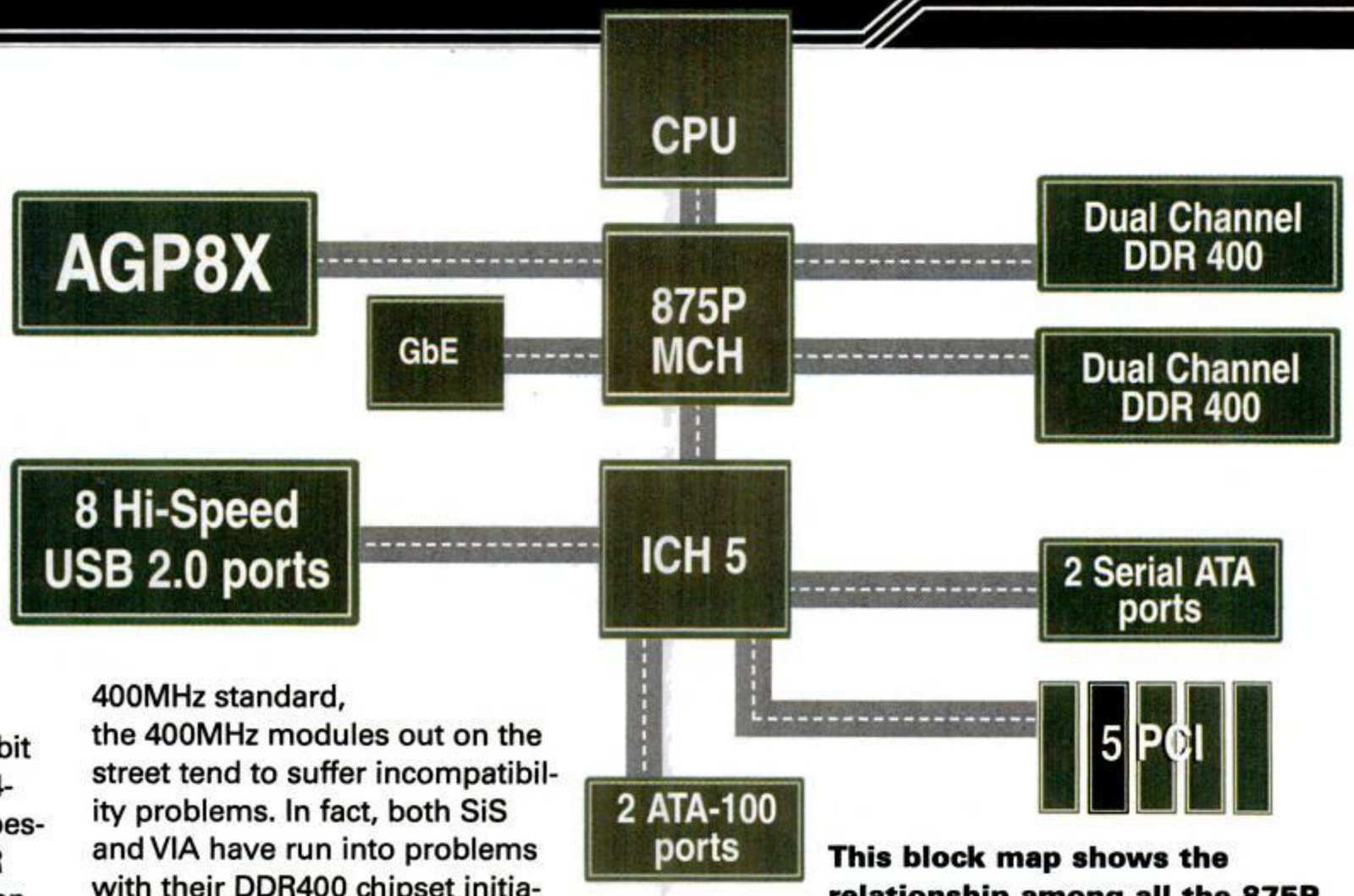
To get more performance from DDR, you must either widen its data channel, add a second channel, or increase its clock speed. Unfortunately, dual DDR is already using two relatively wide 64-bit channels, so the only move is to increase memory clock speed. But this prospect poses another problem: Increasing the clock speed of a wide bus is difficult because it requires an excessive amount of electricity and circuit path finagling.

In fact, problems associated with "going fast and wide" are also spurring the hard drive industry to move away from the relatively wide parallel ATA interface to the more narrow Serial ATA interface. Many engineers didn't think they could push parallel ATA beyond 100MHz, and most hard drive companies have chosen not to dabble with the 133MHz spec (ATA/133).

Now, if you think the case against "fast and wide" is hogwash just because there's been a recent glut of memory modules rated for 400MHz and faster, you're not taking everything into perspective. While some RAM manufacturers have produced DDR memory that can indeed reach 400MHz and beyond, these modules are rare. And because there hasn't been any 400MHz standard, the 400MHz modules out on the street tend to suffer incompatibility problems. In fact, both SiS and VIA have run into problems with their DDR400 chipset initiatives, and mobos based on their DDR400 chipsets have sometimes had to run DDR333.

All of which leads us back to Intel. Intel says that by using its pull in the PC industry, it has developed a set of DDR400 specs that RAM makers will follow. In short, Intel says, the new 875P chipset platform will experience few problems if people use memory modules made by the right manufacturers. Intel also says it has designed its chipset and chipset drivers to compensate for any variations in module quality. Intel concedes that yields of qualified DDR400 RAM will be rather low when the new chipset rolls out.

By all indications, DDR400 will be the final bus stop for DDR—no one should expect to see DDR533 or DDR600 barreling down the turnpike.



This block map shows the relationship among all the 875P chipset components. Gigabit Ethernet (GbE) now has its own AGP-like expressway to the northbridge, and soft Serial ATA RAID tunnels straight into the ICH5R southbridge.

Goodbye RDRAM, We Hardly Knew Ya

It's funny how loyalties and alliances shift so quickly. When Intel announced RDRAM as the memory of choice for its ill-fated 820 Pentium III chipset, the tech world universally shunned the new memory technology. RDRAM offered few performance perks when the P-III hit market, but cost four times as much as PC100. Now, as Intel is set to turn the lights out on RDRAM, the tech world is grieving for that particular memory as though it were a child stricken with an incurable disease.

So why did Intel give up on RDRAM? The company says it's simply responding to customer desires—a simplistic explanation of a much bigger issue. The truth is that Intel has finally been worn down by memory manufacturers, who've fought against RDRAM ever since it was introduced. It also hasn't helped that Rambus, RDRAM's creator, has tried to force its will on everyone through the courts. The company sued worldwide memory makers, arguing that it owned the technology behind DDR SDRAM in addition to RDRAM. Rambus could have also sued nVidia, ATI, or any other company that had a DDR memory controller, so you can see why RAM manufacturers have felt alienated. With very few memory manufacturers fabbing RDRAM, it's become clear that the memory type will never go mainstream. Thus, Intel has decided that in order to pave the way for a happier future, it needs the full support of the memory industry. For this year, Intel sees Dual DDR400 as the answer, while DDR-II will be next year's darling. Conspiracy nuts might envision a secret RDRAM chipset rising from Intel's labs, but they're just chasing

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dreams. No quad-channel RDRAM chipset is on deck. At least not from Intel.

What's In a Name?

The first CPU to ride Intel's new 800MHz bus will be a 3GHz P4. Got it? Good. There's always a swirl of confusion when Intel ups the bus versions of its chips, and the company doesn't really help matters with its stubborn definitions.

To wit: The current fastest P4 is known as the 3.06GHz. It runs on a 133MHz bus quad-pumped to 533MHz. Because 133MHz multiplied by 23 is 3060MHz, the chip has been—and will continue to be—called 3.06GHz. Fast-forward to the upcoming chip. It runs on a 200MHz bus quad-pumped to 800MHz. Because 200MHz multiplied by 15 is exactly 3000MHz, the new chip will be called the new 3GHz. Bus speeds notwithstanding, the two chips do in fact run at different core frequencies, so Intel sees no reason to provide any special designators to signal different retail products. Consumers will simply have to understand that the 3GHz chip is the latest-greatest.

Well, we say horse-hockey to that reasoning. As far as *Maximum PC* is concerned, the 3.06GHz chip is a Pentium 4B, and the new 3GHz chip is a Pentium 4C. The original and defunct 400MHz bus CPUs are, of course, "A" versions. We've seen private demos of the new P4C, and we're impressed. We can't talk about Intel's own specific benchmarks until next month's issue, but we did steal a few minutes with one 875P-equipped system, and it showed 20 percent more performance in *SiSoft Sandra* when compared with a similarly equipped 850E chipset system. This is backed up by online reports that show the P4C/875P combo to be faster than the P4B/850E combo by a considerable margin.

Of course, benchmarks and applications that stress the frontside bus and system memory will certainly favor the new P4C platform. The added bandwidth is also supposed to greatly enhance Hyper-Threading. As one Intel engineer told us, "Hyper-Threading just *loves* the extra bandwidth." We'll have a final report once we get our hands on a real CPU and motherboard, but it's pretty obvious that if you have plans to buy or build a new P4 box, you should avoid 533MHz bus hardware, because it's on the precipice of obsolescence.

Intel engineers told us that there are minimal changes to the thermal or electrical characteristics of the actual P4 chip. A heatsink that supports a 3.06GHz P4B will be fine with a 3GHz P4C, but you won't want to plug an 800MHz bus chip into an older board. Instead, a new mobo with the 875P chipset will be de rigueur. Because Intel's processors will continue to be multiplier locked, a 3GHz Pentium 4C would become a 2GHz chip when plugged into an older 533MHz mobo.

Intel says it will continue to ship CPUs that support 400MHz and 533MHz bus speeds, but no new bin jumps for those bus speeds are planned. We strongly recommend that all Intel enthusiasts invest in 800MHz bus technology for future upgrades.

Meet the 875P—Intel's next BX

Hardcore enthusiasts like to talk wistfully about how awesome the VIA KT133A and AMD 760 chipsets were back in the day. Old-timers have even greater nostalgic affection for the Intel 440BX, which helped propel the Pentium II to awesome heights and seemingly lasted for years. The 875P may be an equally revered and durable chipset if all goes as Intel plans. Developed from the ground up as a response to upstart chipset development from VIA, SiS, and even ATI, the 875P features splashy tricks from the normally buttoned-down Intel. Check it out:

➤ Code-named "Canterwood," the 875P supports dual DDR400 channels that can be clocked down to DDR333 and DDR266. The 875P should run its best when operating in synchronous mode, and for the utmost performance, the frontside bus should run at the same speed as your memory.

➤ In the 875P, Intel also reintroduces AGP 8x support to the desktop. AGP 8x is actually available in the E7205 chipset, which was introduced late last year, but the E7205 was never intended for mass-distribution, and has since been retired. The E7205's main limitation is its lack of support for an 800MHz bus. AGP 8x doubles AGP 4x's 1GB/s bandwidth to 2GB/s. Many mobo companies have been pushing AGP 8x as a check-mark item, but few applications can actually take advantage of the added bandwidth. You don't need AGP 8x now, but you'll likely need it in a year or two.

➤ Another 875P trick is better Gigabit Ethernet support. This fastest of all Ethernet specs is the future of networking, and Intel says it wants to fix its flawed implementation. Apparently, Gigabit Ethernet performance is being stymied by all the data traffic saturating the link between a motherboard's northbridge and southbridge chips. Devices using FireWire, USB 2.0, Serial ATA, Parallel ATA, and the PCI bus are all vying for elbow room, and Gigabit Ethernet is suffering as a result. So, in the 875P, Intel has created a direct 266MB/s port in the northbridge just for network data; the technology is called Communications Streaming Architecture (CSA). The move is similar to creating a high-speed lane for video data (the AGP bus), and should elevate high-speed networking to unheard-of levels. CSA moves data traffic as close as possible to the memory controller, Intel says, and greatly reduces latency and CPU utilization.

Early numbers leaked on the Internet show that the new chipset's networking support offers nearly a 50 percent performance increase over a Gigabit Ethernet controller plugged into a PCI slot. There is one catch, though: The CSA architecture only supports Intel's Gigabit Ethernet chip. This probably won't mean much to consumers, because most people don't care whether their mobo is sporting a Broadcom or Intel chip. But it will mean that board vendors who want CSA must use the Intel Pro/1000 CT chip. So if you find a mobo that supports Gigabit Ethernet, but doesn't have an Intel controller and makes no mention of CSA, you can assume the manufacturer just picked up a lower-cost controller from another vendor, and added it to the PCI bus.

➤ The 875P is also the first Intel chipset to support the ICH5 southbridge, which brings native Serial ATA support and RAID to the table (in its ICH5R version). Sure, some of today's current mobos offer Serial ATA support, but only via a Serial ATA controller hooked into the PCI bus. The 133MB/s PCI bus is of course a potential bottleneck for any possible 150MB/s Serial ATA transfers. (Current hard drives never transfer at 150MB/s, but they will some day.)

The ICH5 southbridge has two 150MB/s Serial ATA ports. Because Serial ATA drives will plug straight into the south-

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RAMbling Down The Roadmap

DDR400 is the last stop for the DDR memory technology we've all come to know and love. We can't unequivocally tell you what will replace DDR, but we can handicap the three strongest contenders...

DDR-II

In the race to replace DDR memory, DDR-II is definitely sitting in the pole position. Work has long been underway to establish a DDR-II spec, and memory manufacturers are already fabbing samples. DDR-II will lower voltage requirements to 1.8 volts, use a ball-grid array package, and employ a technique that pre-fetches four bits of data at a time (DDR400 currently pre-fetches two bits). As a result, DDR-II will fetch twice as much data per memory clock cycle as regular DDR memory, effectively doubling bandwidth.

If you're confused, just consider this: DDR400 runs on a 200MHz memory clock, uses a two-bit pre-fetch, and has a peak bandwidth of 3.2GB/s. DDRII-400, meanwhile, will run on a 100MHz memory clock, will use a four-bit pre-fetch, and offer the same 3.2GB/s peak bandwidth. Now, if this doesn't sound impressive, just consider what happens as you increase DDR-IIs memory clock. If you ratchet it up to 200MHz—the core clock speed of today's fastest DDR—you'll have an effective speed of 800MHz, good for 6.4GB/s of bandwidth.

One downer for hobbyists: DDR-II may require an entirely new motherboard infrastructure. DDRII-400 and DDRII-533 are expected to arrive en masse by 2004. This one's a done deal.

Quad RDRAM

RDRAM might very well persist in PCs if SiS makes good on its plans to introduce a quad-channel RDRAM chipset later this year. The chipset will use RIMM3200s, those funky sticks that shove two RDRAM channels into a single module.

The chipset would have one advantage: It only requires PC800 RDRAM, which is in plentiful supply. This alone might help RDRAM stave off the DDR takeover, if only briefly. But of course, even if SiS does enjoy some success, Quad RDRAM won't go anywhere without Intel's approval. We wouldn't invest in Quad RDRAM anytime soon.

Kentron's QBM

VIA says it plans to introduce support for Kentron's quad-band technology, which uses a special chip within the module to double memory speed. A DDR400 module with a QBM chip would thus become an 800MHz module in single-channel mode. In dual-channel mode, you'd get a yummy 12.8GB/s on an 800MHz bus.

Even better, VIA's QBM chipsets would let you use either standard DDR modules or QBM modules. One downer, however: QBM chips will add a few bucks to any stick of memory you buy. Like quad-channel RDRAM, we think QBM will be a niche product at best.

continued from previous page

bridge instead of the PCI bus, they'll benefit from reduced latency. Native Serial ATA support will also eliminate the need for drivers. Boot up an 875P motherboard with a floppy disc, and you'll be able to see your Serial ATA drives just as if they were parallel drives.

➤ The 875P is also the first chipset we know of to offer native soft RAID support (when teamed with the ICH5R southbridge). Instead of working with a separate controller chip, the 875P assigns RAID 0 controlling chores to the CPU. Even better, the 875P will let you build or destroy a RAID 0 array on the fly without having to reinstall the OS. If you start with a single Serial ATA drive and decide you want to move to RAID 0, you simply add a second drive and the Intel drivers will create the RAID relationship. If you want to move off of RAID, you execute an application to revert to a single drive.

➤ Intel has one final trick up its sleeve—"Performance Acceleration Technology" (PAT) that will separate the 875P from its little brother, the "Springdale" chipset, which is aimed at budget machines. PAT will reduce latency between main system memory and the CPU. Some at Intel compare PAT with a "Turbo" mode that can give you more performance.

Amazingly, Intel says 875P motherboards can be built with a lower-cost, four-layer production process—six layers are not required. Because the 875P supports all three of Intel's P4 bus-speed flavors, any mobo running the chipset will give you a nice upgrade path. For example, let's say you're currently running one of the original P4s designed for a 400MHz bus. That's fine. You can buy a new 875P motherboard and plug in your old CPU. Then, later, you can buy a new P4C processor when prices begin to drop. We don't expect a more significant chipset breakthrough until Intel introduces its first PCI Express chipset in 2004.

Dual-Channel Showdown: Which Chipset Is the Best of the Rest?

While the 875P is the highest-performing dual-channel chipset ever created, it's not the only one on the market. So we rounded up the existing dual-channel P4 chipsets, and pitted them against each other on their relatively slow-bandwidth byways. We ignored single-channel chipsets entirely; we already know they can't compete. SiS's first dual-channel RDRAM chipset—the R658—is also missing. We just couldn't get a motherboard in time. This is a shame, because it leaves the dated Intel 850E as the only dual-channel RDRAM chipset in our showdown.

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DARE TO COMPARE: Dual-Channel P4 Chipsets

	Intel 850E	Intel E7205	SiS655	SiS655
RAM type	PC1066 RDRAM	DDR266	DDR333	DDR400
RAM speed	1066MHz	266MHz	333MHz	400MHz
CPU speed	3.06GHz	3.06GHz	3.11GHz	3.11GHz
Theoretical memory bandwidth	4.2GB/s	4.2GB/s	5.4GB/s	6.2GB/s
Quake III Arena (normal settings, audio disabled)	361 fps	358 fps	**364 fps**	353 fps
SYSmark2002 Overall	301	296	**313**	302
SYSmark2002 Internet Content Creation	421	417	**429**	419
SYSmark2002 Office Productivity	215	210	**229**	218
SiSoft Sandra 2003 Composite	3354/3347	3312/3311	**3436/3445**	3371/3371
3DMark2001 SE Overall (patched)	15504	15276	**15663**	15394
3DMark2003 Overall	4778	4761	**4829**	4814

Bold denotes highest score.

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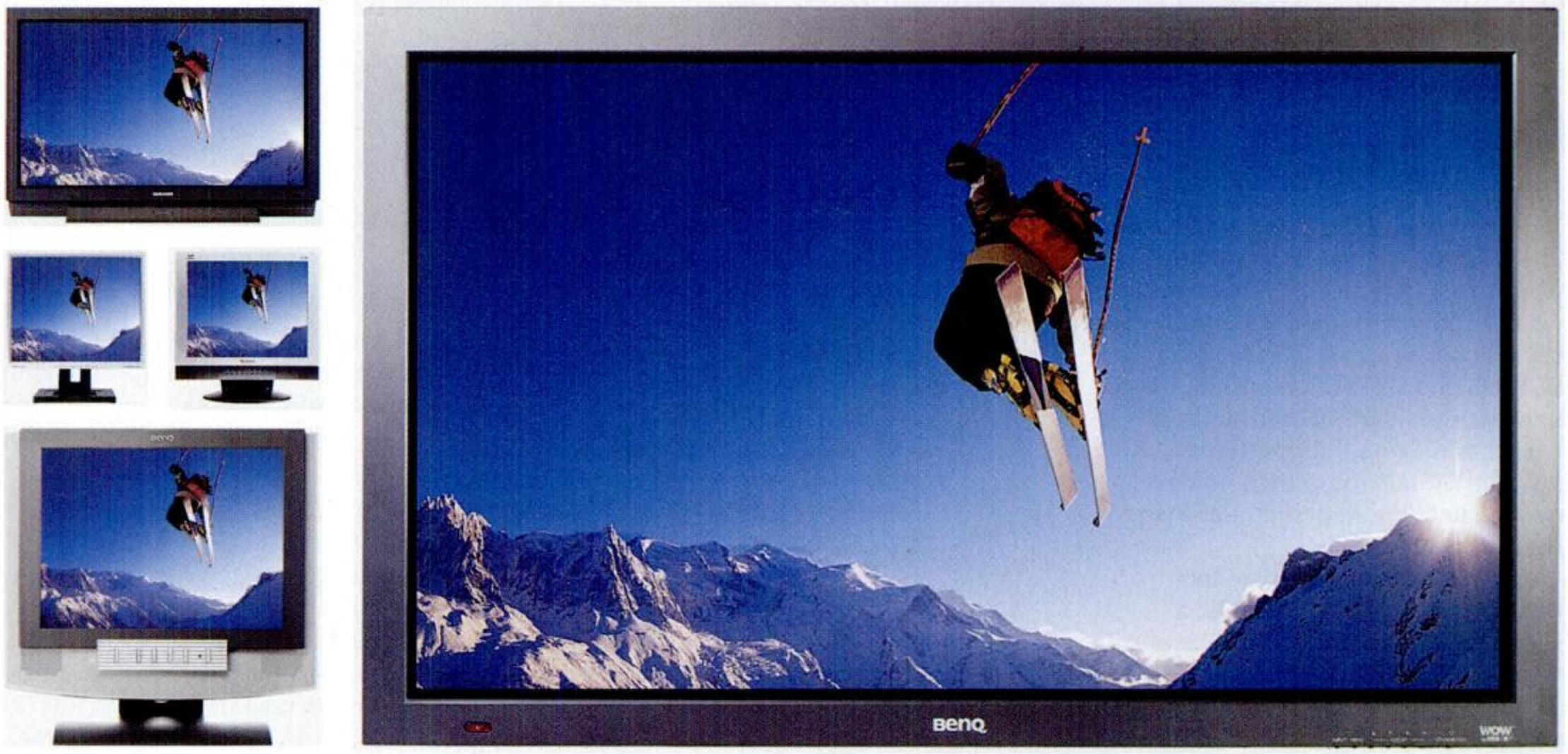

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In addition to the 850E, we tested Intel's E7205 chipset (aka Granite Bay), which uses logy DDR266 memory. But we did score a nice wildcard in the SiS 655 chipset. With support for both DDR333 and DDR400, the SiS655 helps quell worries that SiS has slumped back into making budget chipsets. In fact, the SiS655 more than holds its own against the reigning dual-channel champion, the 850E.

For our tests, we used an Intel D850EMV2 mobo for the 850E; a Gigabyte 8INXP for the E7205; and a Gigabyte SINXP1394 to represent the SiS655. All testing platforms used the same 3.06GHz P4B, an ATI Radeon 9700 Pro, a single Western Digital WD1200JB, and 512MB of memory (Kingston RDRAM for the 850E and Corsair PC3200 for the DDR boards). Because the SiS655 supports both DDR333 and DDR400, we tested the chipset at both speeds.

So which chipset ruled the roost? Surprise, surprise, we actually saw the best performance from the Gigabyte SiS655 board running asynchronously at DDR333. We must note, however, that the SiS655 motherboard was running slightly overclocked (the SINXP1394 mobo, like many enthusiast boards, runs its PCI bus at 34MHz). The overall result is an extra 50MHz of CPU clock speed over the E7205 and 850E motherboards. That said, what we saw from the SiS655 chipset was still impressive.

Of course, this is all rather academic, because we won't have numbers on the 875P chipset until next month. Drat!

Prescott: Big Performance, Small Package

Intel's next-gen CPU will feature fat cache, new instructions, and improved Hyper-Threading

Intel must be getting cocky, because it has never released so much early information on a next-gen CPU. Due in about six months, the chip code-named Prescott is destined to replace the Pentium 4, and will be Intel's first product on its new 0.09-micron (90 nanometer) process. The shrink from 130nm to 90nm is a big step forward because it gives Intel much more chip real estate to play with. The primary benefactors will be L2 cache (it's doubling!), and new instructions that improve "multimedia" and gaming performance. Prescott will use the same 800MHz bus that Intel just announced.

Larger cache sizes will help Prescott offset problems resulting from the widening clock-speed disparity between CPUs and main system memory. With the advent of the new 875P chipset, CPUs are running at 3GHz, while DDR SDRAM is still hitting just 200MHz (albeit double-pumped for an effective 400MHz). But during its lifetime, Prescott will march toward an expected 5GHz. Its CPU frequency jumps will surely outpace RAM speed advancements as the months and years wear on. The upshot is that Prescott's larger cache sizes (L1 is increasing to 16K; L2 to a whopping 1MB) will help mitigate the clock speed disparities, and hopefully reduce the CPU's interaction with main system memory.

The new 90nm process signals Intel's first use of "strained silicon"—the actual atoms in the chip are stretched, literally spaced further apart than those of normal silicon. Straining the silicon enlarges circuit paths and allows electrons to flow more freely. This is important, because with a 90nm process, electrons are already being forced to squeeze through incredibly small pathways. Intel is also working to improve the chip's insulation technology to reduce interference as electrons drive through their circuit paths. And, finally, Intel will tinker with Hyper-Threading and the core's pre-fetch branch predictor, and redesign the layout of its core to improve floating-point performance.

When introduced late this year, Prescott may feature enough enhancements to warrant a name change to Pentium 5. Of course, Intel won't comment on this, and its corporate branding team probably hasn't yet made up its mind, but a name change could eliminate a lot of confusion if Prescott's first clock speeds match those of the fastest Pentium 4Cs. After all, what's more attractive, a Pentium 4C at 3.4GHz or a Pentium 5 at 3.4GHz? If past is prologue, confusion could be rampant. When Intel switched from the Willamette to Northwood core, it didn't rename the chip.

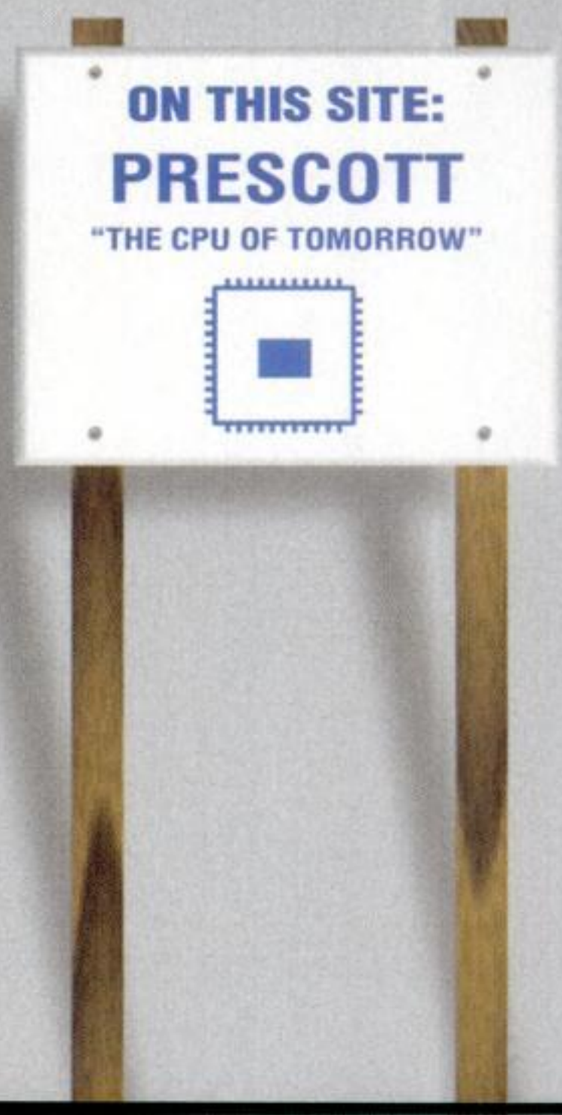
Even if Prescott isn't dubbed Pentium 5, we suspect the follow-up chip, Tejas, will certainly earn that distinction. Due in the second half of 2004, Tejas will use the 90nm process, but should differ from Prescott considerably. It will be teamed up with Intel's first PCI Express chipset, support DDR-II memory, and run much cooler than current CPUs. Tejas may also break from the conventional pin grid array in favor of a clamp design that some are calling "Socket T." As for clock speeds, how does 6GHz grab you? Internet scuttlebutt also has it that the Tejas chipset will run a 1066MHz frontside bus.

Beyond Tejas, we don't even have murky rumors, but rather just a code-name—Nehalem, a chip slated for sometime in 2005. Whispers say Nehalem will be a complete redesign of the Intel core and architecture, but will still use a 90nm process. As for any type of specific specs and features, your guess is as good as ours.

Intel isn't stopping at 90nm, of course. The company has been on a mad march toward ever-smaller process technologies since 1989. In 1997, it introduced a 0.25-micron process technology in the Pentium II. In 1997, it introduced a 0.18-micron Pentium III. In 1999, it introduced a 0.13-micron Pentium III, and this process held firm in the Pentium 4.

Later this year, we'll see Prescott launch at 90nm, and in 2005, Intel plans to unroll a 65nm process. Finally, in 2007, the company expects to introduce a 45nm part. In what types of chips these new processes will appear, we don't yet know. In every new generation, the company says it sees a 0.7x decrease in sizing, a 2x increase in transistor density, and a 1.5x increase in transistor speed. If technology continues at this rate, Intel predicts its CPUs will have 1 billion transistors by 2007. Intel says that by 2010, its basic Pentium 4 architecture could be running in the 15GHz to 20GHz range. Of course, by that time, the P4 core will be old hat. But it's always fun to theorize. ■

Intel's new 90 nanometer process technology boasts transistors that are as small as 50 nanometers—that's actually smaller than the influenza virus. Use that little tidbit of information to shoot down any loudmouth who says we haven't yet entered the age of nanotechnology.



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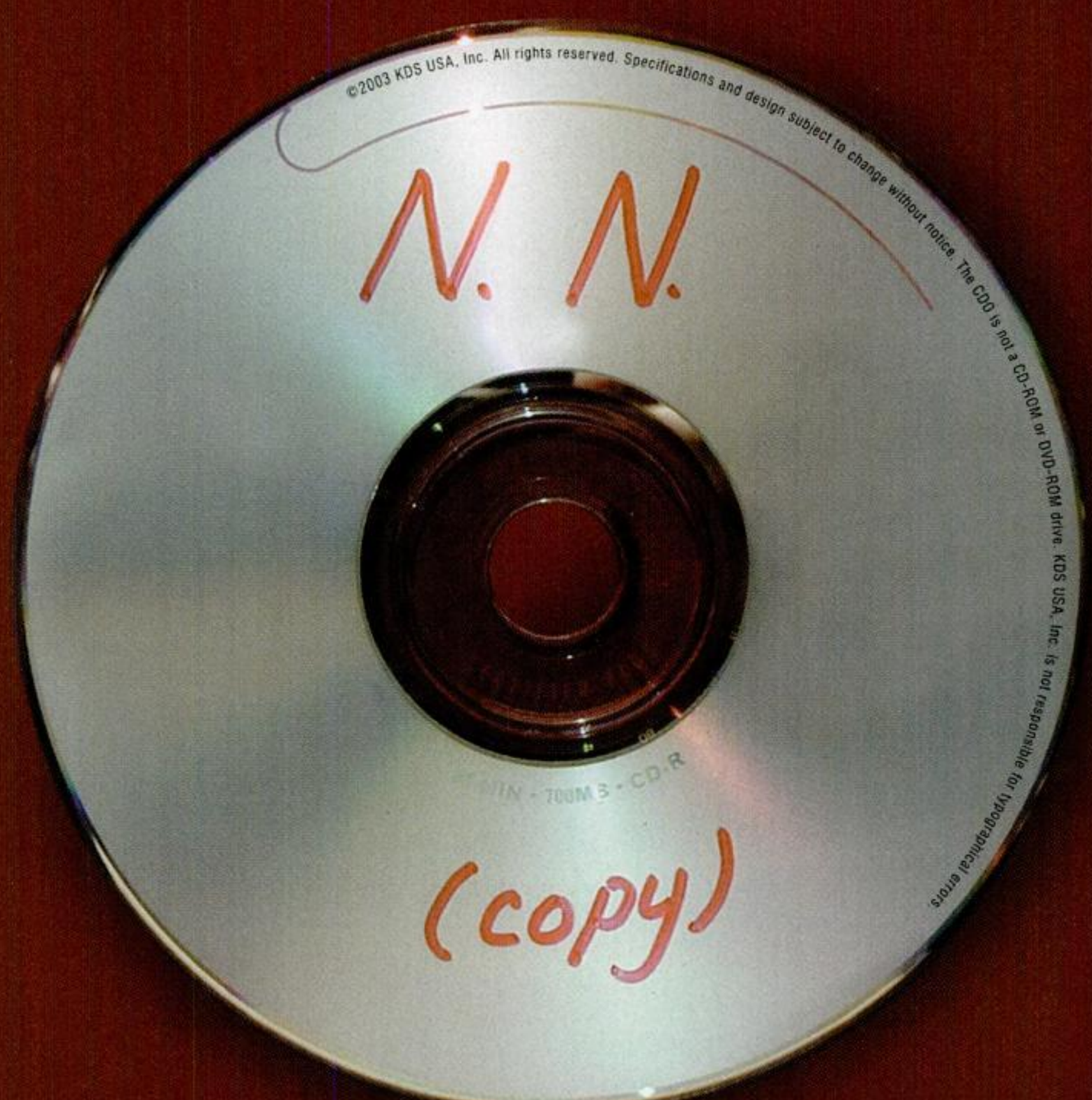
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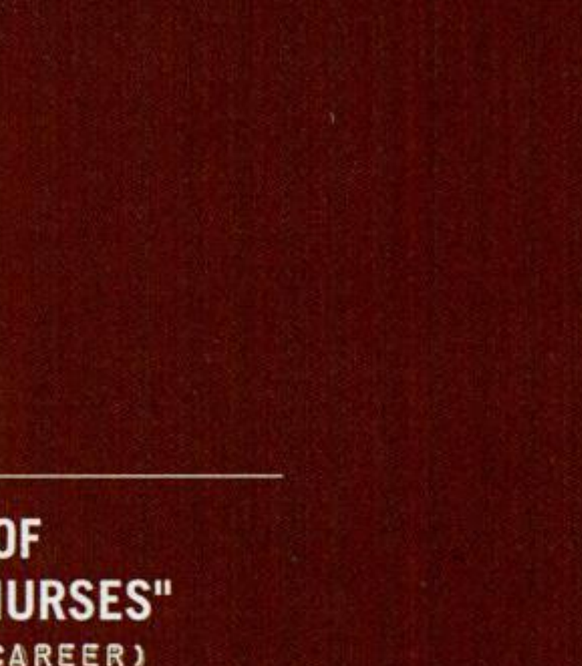

[1]Uses your PC's CD-ROM or DVD-ROM drive to scan discs. [2]Internet access is required to download track titles of published audio CDs. [3]Use of USB hubs may be required to connect multiple towers.

Cold. Bright. Colorful

A dim case window earns zero bragging rights. So, for your modded case to really strut its stuff, you'll need the internal illumination that only a cold cathode tube can provide. After all, a Radeon 9800 doesn't look any different from a GeForce MX in the dark. The 12-inch cathodes featured slightly larger than life-size here cost about $15 for a single tube, and $25 for dual tubes. Available from www.plycon.com, www.crazypc.com, www.pctoys.com, and www.svc.com

TRIPPING THE MOD FANTASTIC

Your custom-built PC dream machine might be packed with the hottest CPU, videocard, and hard drives money can buy, but if you're still housing your precious parts in a plain-Jane tower, your screamer's no more bumpin' than your mama's washing machine.

If you want your PC to look as fast and furious as possible, deck it out with a few of the accessories featured in this article. Each of the components has been tested and approved by the Maximum PC Council For Hardcore Beautification.

BY BRIAN LAM

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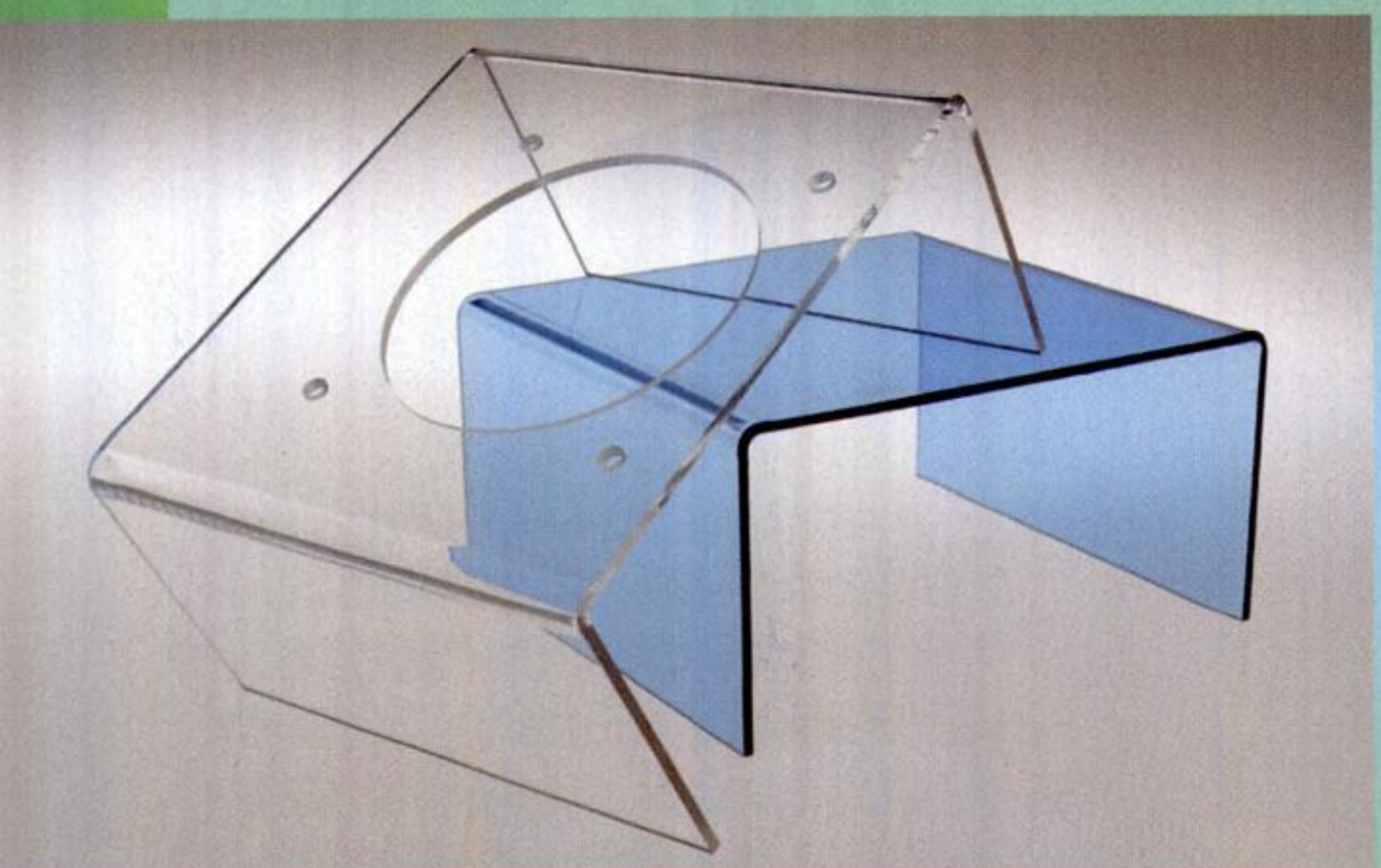
4-Inch Cold Cathodes

Four-inch cathode tubes can be squeezed into all the tight places that their 12-inch brethren can only dream of entering. You'll give up some lumens, but be duly rewarded with a more accommodating footprint. The micro cathodes fit into drive bays and are small enough to occupy any crowded cranny. And, if you're looking to spice up a Shuttle-type micro ATX formfactor enclosure, these tiny tubes are the only game in town. **$13, www.pctoys.com**

Decorative Thumbscrews

At a passing glance, these shiny nubs of metal could easily be mistaken for the faux gold teeth of a rap star—*bling, bling*. But closer inspection reveals they're flashy renditions of commonplace computer screws. And you don't even need a screwdriver to use them. Besides allowing your case panels, drives, and cards to be hand-tightened into place, the screws come anodized in just about every color, so you're sure to find the perfect complement for your "design theme." You should also be on the lookout for look-alikes of the screws that Cooler Master uses in its high-end cases. These screws have a Phillips top, so they can be either leisurely tightened by hand or fastidiously fastened with a screwdriver if you're the extra-cautious type.
$4 for 20 screws; www.svc.com



Acrylic Power Supply Mod

A power supply isn't all that much to look at, what with its lackluster casing and staid FCC sticker. And its uninspiring appearance can be downright irksome when your PC's interior is on constant display through a modded case window. Indeed, the PSU can totally disrupt the feng shui of your PC's innards. But if you have the huevos to crack open your ATX power brick (unplugged, of course), you can swap your PSU's original steel enclosure for a much hipper, colorful acrylic jobbie from Directron. Prying eyes will be treated to an array of PSU internals as seen through a sturdy, tinted shell. Available in configurations for most power supply formats, these PSU case mods come in about every color imaginable. **$11; www.directron.com**

Neon Maxx Blacklight Accent Paint

When viewed under normal light conditions, PC Toy's blacklight spray paint is completely invisible. But flip the switch of some UV cathodes, and suddenly your case is Studio 54 (albeit much smaller, full of wires, and without all the cocaine). The neon paint is an obvious adornment for components like fan grilles and heatsinks, but ambitious modders might go so far as to craft custom stencils for more elaborate paint jobs. The paint is available in red, green, hot pink, white, blue, yellow, purple, and orange. But please don't use all the colors on a single case unless you're going for a "Tammy Faye" motif. **$15; www.pctoys.com**

Electroluminescent Tape

Only a mad scientist could have thought this up: Crossbreed adhesive tape with the visual flair of a cold cathode tube to produce the marvel that is EL tape. Thin and flexible, the tape is the most form-fitting of all PC lighting solutions. Wind it around case edges, across windows, and over just about anything the sticky backing will adhere to. Trim the tape any way you want, but be aware that the included inverter has connects for just two pieces of tape. Don't expect the tape to glow brighter than cathodes, but it is perfect for places where other lighting won't fit.
$12; www.directron.com

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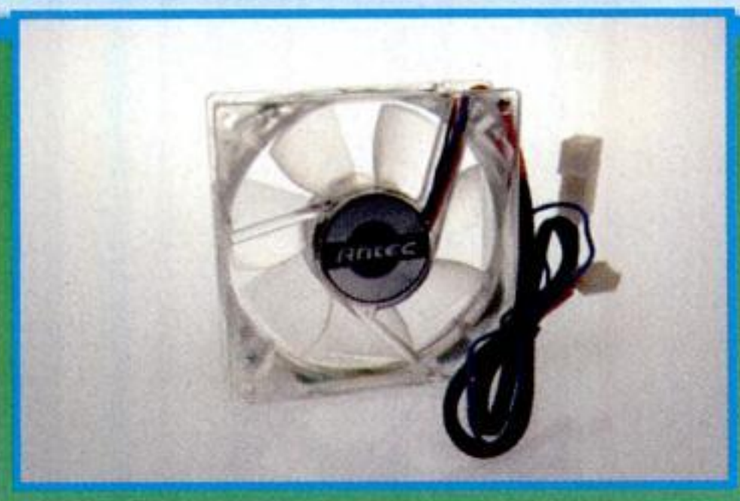
Trilight LED Fan

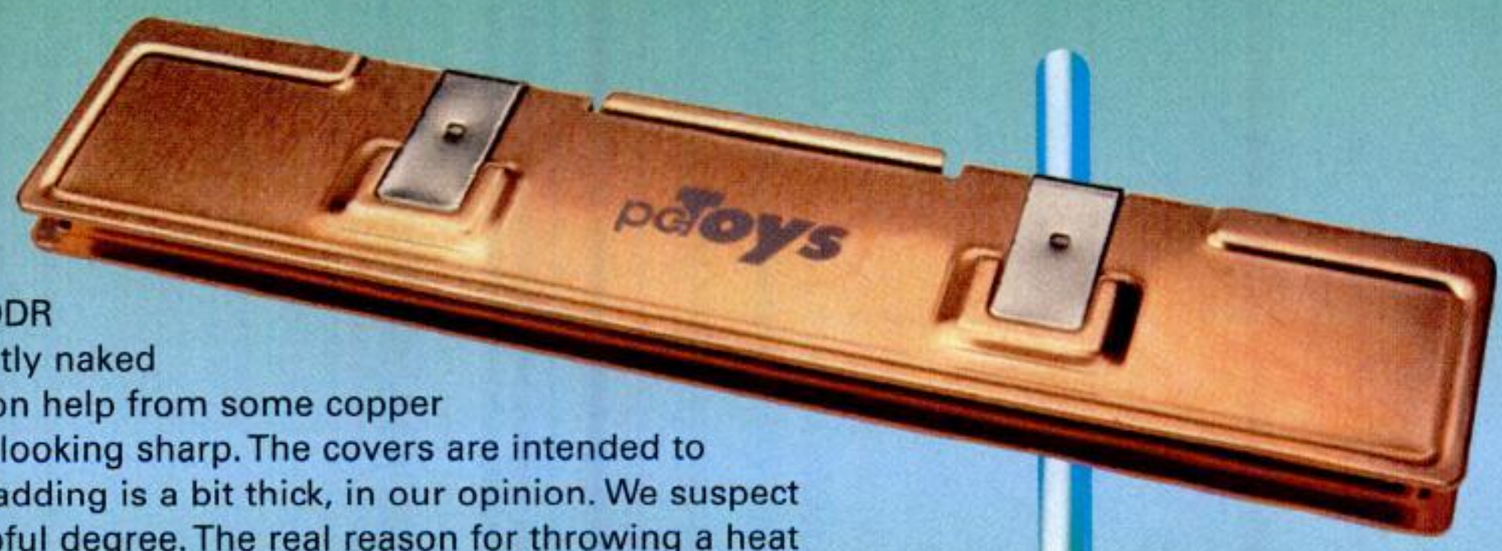


Antec's Trilight LED fan isn't *all* show. Besides creating a veritable light-show of your case's interior, the fan's 2,200rpm triumvirate of LEDs serves to keep your case temps down. The LEDs siphon their power from the fan's main line, so the multicolored spectacle doesn't come at the expense of wire clutter. The Trilight LED fans come in both 80mm and 120mm sizes. Perhaps best of all, the LEDs don't increase the fans' profile, so they'll mount anywhere a standard fan would. We can't testify to the prowess of the fan—there are better blowers—but this whirlybird does look good. **$25 for 120mm, $10 for 80mm; www.antec-inc.com**

Electroluminescent Case Badge Light

Case badges were the original case modification. Swapping an "Intel Inside" sticker for an AMD badge was a cheeky tweak that let people know whose hardware powered your box. That was back in the day when cold cathodes could be found only on the undersides of Turbo Supras. Bring your modded case badge into the current millennium with an electroluminescent case-badge backlight. Drill a small hole in your case, slip the thin EL-powered panel into place, and then situate your badge atop the backlight for a cool radiating effect. **$19; www.directron.com**

DDRMaxx Copper Memory Heatspreader



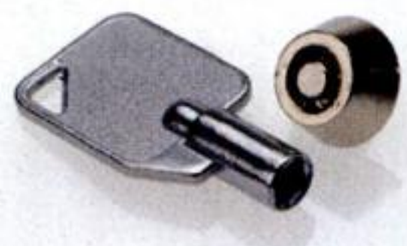
If you didn't spring for performance DDR RAM, it's likely you're sporting unsightly naked DIMMs. For shame! With a little fashion help from some copper covers, you can have those bad boys looking sharp. The covers are intended to tame RAM temps, but the adhesive padding is a bit thick, in our opinion. We suspect they won't cool your RAM to any helpful degree. The real reason for throwing a heat spreader on sufficiently cool DDR is to appease the eye. Mounting these smooth, reflective copper spreaders is the easiest way to dress up raw, drab RAM chips. **$10; www.pctoys.com**

Military Switch

When the firefight gets underway in *Battlefield 1942*, wouldn't it be cool to sound a red alert and throttle up your auxiliary fan array with a simple flip of an honest-to-goodness military switch? That's just one of the many possible uses for this all-purpose, heavy-duty case switch that's indeed approved for use by the U.S. armed services. A finer toggle you will not find. A bright red safety cover prevents misfires, and by throwing it into its prone position, the underlying switch is kept safely off. We'd like to see a row of these switches complementing a custom camouflage paint job for the ultimate ready-for-action aesthetic. Set the switches up to control any of your accessories. Just make sure you have a drill, a 15/32-inch bit, and a soldering iron for proper installation. **$23; www.directron.com**

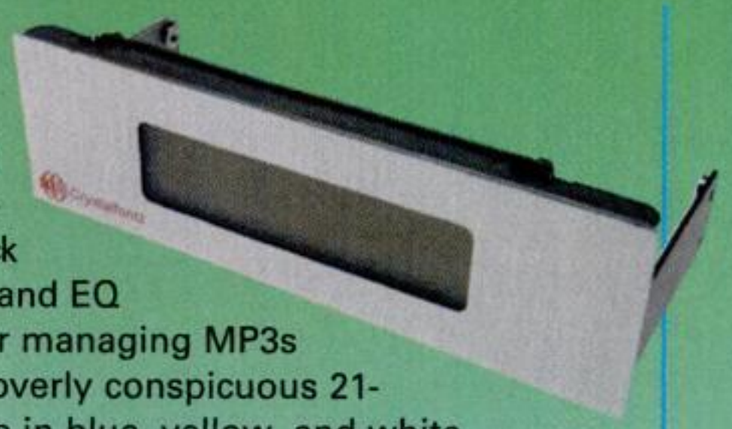
Security Case Screw

Paranoid PC users, rejoice. These chromed security screws make unauthorized parts removal impossible—without the included key, that is. Taking the place of standard screws, the security screws can keep LAN party competitors from messing with your components. They can also securely lock down your drives and PCI cards. Because they look so good, you'll be tempted to use the screws throughout your case, inside and out. But don't be overzealous. If you switch parts regularly, you'll find that these screws take a bit more time to tinker with than the regular variety. One more hint: Don't lose that key unless you're prepared to run your current parts indefinitely. **$4 for one screw and key; www.directron.com**



Crystalfontz LCD Display Kit Model 632 USB

With the Crystalfontz LCD display, you'll be able to appraise your PC's status at a glance. Set up the backlit screen to report a number of useful stats in the highest of style. We've set up our LCD to show CPU utilization, e-mail subject headers, MP3 track names and numbers, and EQ settings. It's perfect for managing MP3s without the aid of an overly conspicuous 21-inch monitor. Available in blue, yellow, and white backlights, with black or silver bay mounts, there's a Crystalfontz LCD display out there that's sure to match your lifestyle. **$80; www.highspeedpc.com**

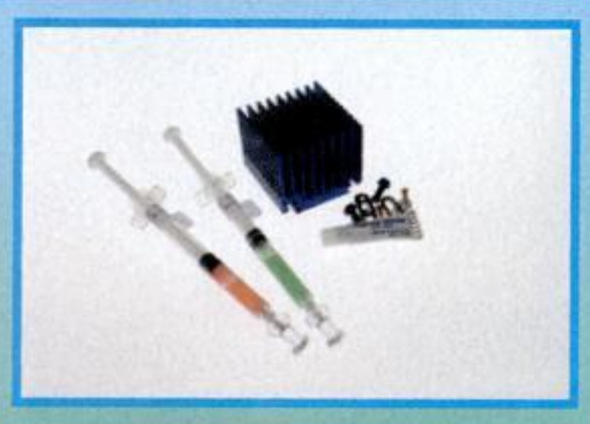


Sunbeam Cathode Fan

Here's an interesting twist: You don't necessarily want to highlight the gear in your box. Rather, you're hoping to detract attention from the dust bunnies and disorder inside your PC. When it comes to case fans, you can't get any more eye-catching than the extra-strength lighting of a cathode. We weren't thrilled about the added cable clutter of the cathode and power inverter, but the truth is, you barely notice it (or any other imperfections) amid the fan's blindingly bright lights. The downside? The fan grill is thick enough to make traditional mounting locations tricky. **$19; www.directron.com**

North Bridge Maxx Chipset Cooler

Some motherboards have fans on their northbridge chips, and some have heatsinks. Then there's the kind of motherboard that has neither, and looks the worse for it. Place this shiny, blue porcupine of a heatsink on your bare northbridge chip to cool it off a few degrees, and increase your mobo's pimp factor ten-fold. The heatsink is passive, meaning it should provide enough cooling without a dedicated fan. Be warned: Once the thermal paste goes on, the aluminum heatsink ain't coming off. **$10; www.pctoys.com**



Cathode Sound Module

People tap their feet and clap their hands to the sound of music. But PCs just sit there, lame and inanimate, despite the irresistible kick and snare drum in Britney's new Top 40 hit. How'd you like to see your PC do the Running Man while cranking out the tunes? Well, *that's* not gonna happen. But the sound-sensitive cold-cathode controller is the next best thing. Plug it in and your PC's lights will get all jiggy wid it, flashing on cue with low-frequency beats. The microphone sensitivity is adjustable so you can sync it up just so, then sit back and enjoy the show. **$6; www.pctoys.com**

Nexus Fan Controller

With its sci-fi etchings and blue button halos, the Nexus is one of the most handsome fan buses around. And with four fan dials on its fashionable black (or silver) faceplate, the Nexus is also robust—capable of handling even the biggest, baddest air pushers. (It's rated at 19 watts per channel, which is powerful enough to accommodate even fast 92mm fans.) While it would've been super-cool if the relative speed of each fan correlated with the relative intensity of each knob's LED, that's unfortunately not the case. Each ring gets fully blue regardless of how much power its associate fan is using. But we must admit, it does look purty. If you're one of those *Star Trek* nuts with a computer known affectionately as the Enterprise, this fan controller is a must-have for your fleet. **$30; www.vantecusa.com**

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From Beige to *Bombastic*

How to turn a no-nonsense full-tower into a knockout

The Addronics 7890A full-tower case is nice and all, but it's not in and of itself the stuff of dropped jaws and double-takes. For that, you need the magic that is modding...

Many mod accessories are inexpensive and easy to install, making the possibilities for case decoration practically limitless. As you can see, we went all-out sprucing up the Addy, using just about every doodad discussed in this feature.
Now *that's* a looker!

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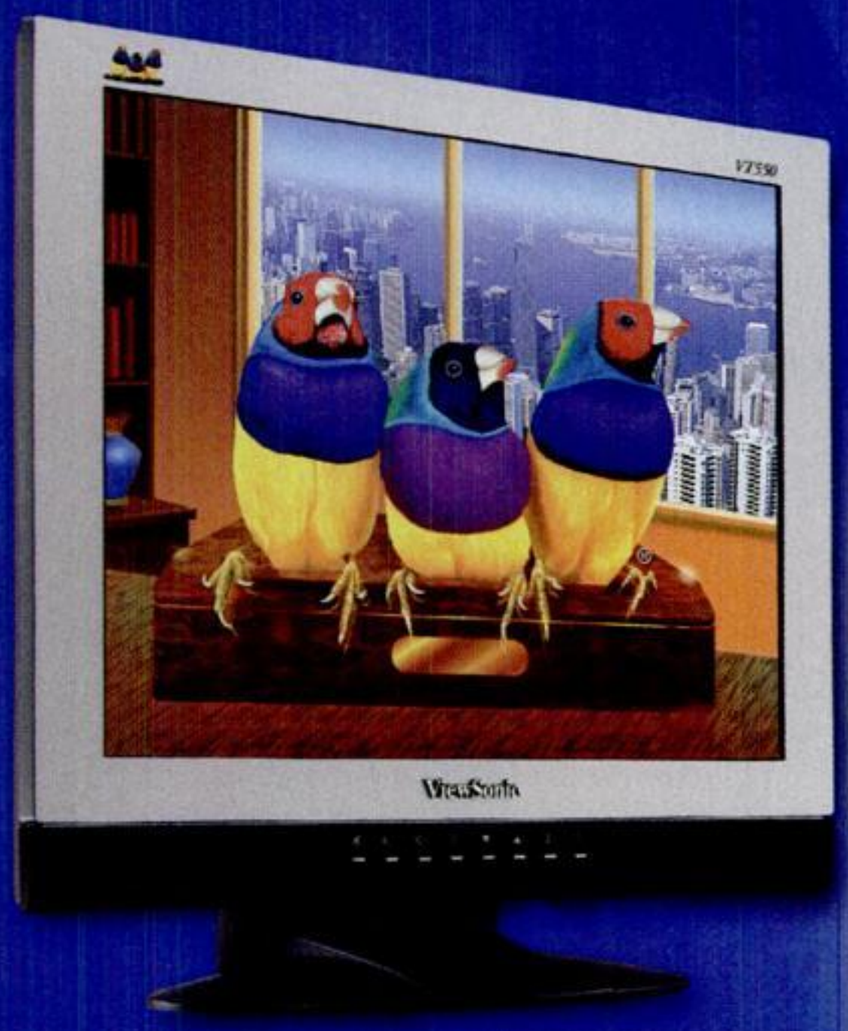
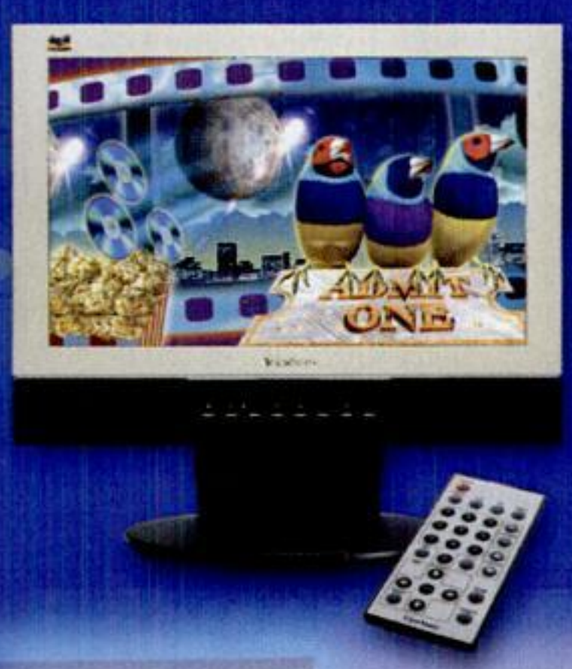
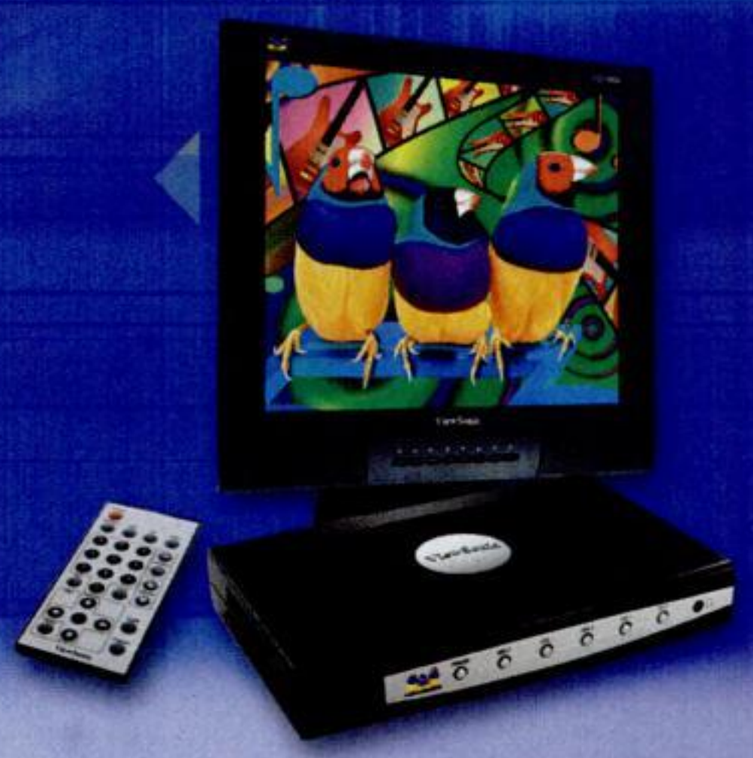


That's Entertainment, ViewSonic® Style.

With ViewSonic, entertainment doesn't cost more, it simply looks better. TV, gaming, music, home movies and digital photos are an integral part of life. With breakthrough video processors and digital media centers plus widescreen HD displays, ViewSonic merges all your entertainment options into powerful, easy-to-use technology with breathtaking image quality and fingertip remote control. For instance, the new VT550 15" LCD TV System is designed for both work and play with exceptional video screen performance, including 181 channel capability, complete multimedia functionality and off-the-desk video cabling at a fraction of the price of other LCD TVs.

Now Every Room Can Have A View





Uptime, downtime. Work and play on the same wide screen LCD TV. ViewSonic has made the desktop far more than a simple workspace. Now it's a virtual visual playground on the N1700w wide-format 17" LCD with its own 181 channel TV tuner and remote control convenience. With additional connections for PC, DVD player, VCR, gaming console and digital cameras, your desk chair may be the best seat in the house!

Enrich family viewing with spectacular next-generation technology. ViewSonic's big-screen 42" and 50" plasma displays coupled with the incredible power of the new M2000 Digital Media Center provide a larger-than-life entertainment experience that's as versatile as it is easy to use. Sit back with your remote and watch and record TV and DVDs, store, organize and play music, movies and more. On-screen menus make it all as easy as a click of the remote.

Expand your entertainment vision. Add TV to any monitor. Check out the complete line of advanced video processors from ViewSonic. They transform your display into a complete entertainment experience. Simple connections for high definition TV, DVD, VCRs, gaming consoles and digital cameras expand your desktop viewing capability for an amazingly low price. Use the remote to quickly switch between these options and your existing PC.

See your dealer today, contact ViewSonic at 1-800-888-8583 or visit ViewSonic.com.

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Ask the Doctor

Symptom » Diagnosis » Cure

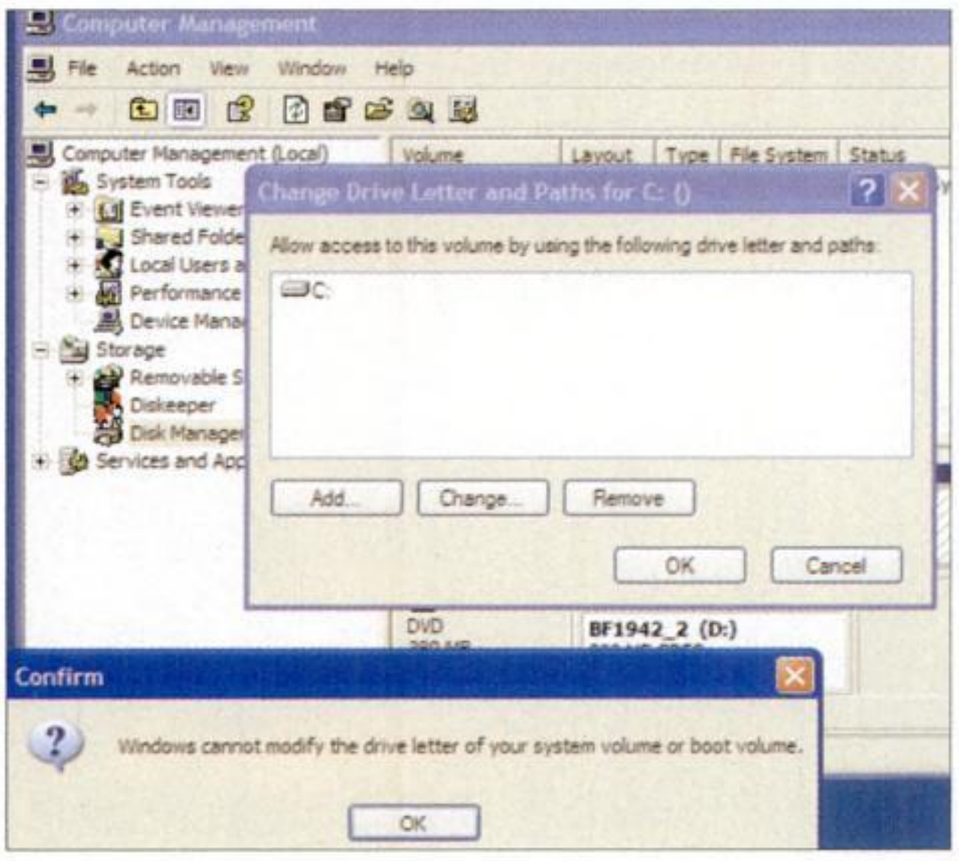
Have a burning PC problem? How about a burning PC sensation? We're more than happy to help you with your PC problems, but you might want to get that sensation thing checked out by a qualified sensation checker-outer. If you have PC questions, send them to **doctor@maximumpc.com**. Just remember: We can't answer every e-mail. Oh, *no*—not by a long shot.

Backing-Up Before a Reinstall

My computer is running Windows XP Home. The computer itself works, but an error occurred, and now I'm unable to start Windows. I have tried a number of things to repair the OS, but the only thing left is to do a clean install, which will wipe my entire hard drive. Is there a way to copy my files to another computer or to a CD using DOS command prompts? I know Windows has a "settings and files transfer wizard," but as far as I know, Windows has to be running on both computers to use this. Thank you in advance for your response.

—JAKE FRIESEN

The Doctor has not found any way to change the drive letter for the boot drive without also completely destroying all the shortcuts and Registry references at the same time.



Windows XP's built-in utility won't let you change the letter on the boot drive, to avoid hexes and demons.

You have two options: You can transfer the info from the old hard drive to another drive or floppy disk using the command-line-based Recovery Console, or you can use a third-party utility, such as *Drive Image* or *Ghost*, to back up the drive to CD or DVD, and then extract the files you want when the system is up and running.

We recommend the image program over the recovery console. It's difficult to recover any file larger than 1.44MB using the recovery console if you don't happen to have a spare hard drive around. If you do want to try the recovery console, boot off the Windows XP install CD, then select the Recovery Console option at the first prompt.

Why Did I Get an F?

I recently built a new system, and I put my original hard drive that still contained all my data in the new system. I really just wanted to copy the contents of the old drive to the new drive, but when I installed WinXP Pro, it labeled my new drive as F:.

I don't understand why this happened. The old drive was supposed to be the slave, and the new drive the master. But the old drive is labeled C:. I took the old drive out after transferring what I needed, but the new drive is still labeled F: I tried to change it, but I get a message saying that I cannot change the drive letter on an MBR. Is there anything I can do, short of reformatting and reloading? Or am I just stuck with an F: drive?

—ROBERT GOOD

Now that you've managed to get everything installed on F: and have been booting off that partition, you're probably stuck. The Doctor has not found any way to change the drive letter for the boot drive without also completely destroying all the shortcuts and Registry references at the same time.

Booting off the F: drive isn't inherently wrong, it's just a little odd. As long as you can cope with an occasional bit of weirdness, your PC will be just fine. Of course, if you want your hard drive to be C:, you'll need to wipe the new hard drive, remove the old hard drive, and install Windows to the new drive. Then, after everything's up and running, reinstall the old drive and pull your files from it.

I've Got Trace.log Coming out of My Ears!

For the last several weeks, I've had a very annoying problem with my Windows XP system. My C: drive has a file called Trace.log that grows until it fills all available space on the drive (about 6GB) in a matter of hours. If I reboot, the file is deleted and a new file is created and begins to grow again. I believe some kind of trace was triggered when I had trouble running a Microsoft utility called *Bootvis* that's supposed to speed up boot times on the PC. I reinstalled the utility and told it to stop tracing, but the activity persists. How do I determine who or what is causing the trace log to grow?

—MARK WATSON

Getting rid of a stray trace log is easy enough. Just go to Start >Control Panel (make sure you're in classic view) >Administrative Tools >Performance. Click the Performance Logs and Alerts section, and then click Trace Logs. It's probably safe to delete anything that's in there.

The *Bootvis* utility uses trace.log to record everything that happens during your PC's boot process. It's supposed to stop recording once your PC finishes booting, but if it doesn't, it could easily absorb all the free space on your drive in short order.

For those people who aren't familiar with it, *Bootvis* is a great little utility that lets you optimize your PC's boot time. The fastest way to find the utility is to type the name into www.microsoft.com/search. A link to a download page should be the first option you see.

Smaller, Slower, Worse

I have a PC with an internal 6-in-1 card reader and no floppy drive. I would like to install Windows XP onto a 512MB CompactFlash card and use the 6-in-1 card reader to try several different OSes. I have a few different CF cards and would like to put a different OS on each one. This way I could boot into the OS of choice by inserting the correct

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CompactFlash card before turning on the PC. Is this even possible?

—RON ALDINGER

What you want to do might be possible, Ron, but the Doctor strongly advises against making the attempt. There are quite a few reasons it's a bad idea.

First, a 512MB CompactFlash card isn't big enough to hold Windows XP. We haven't tried to minimize disk requirements with the new OS, but the smallest install we've seen approaches 1GB.

Second, CompactFlash is slow. To add insult to injury, your 6-in-1 card reader is probably connected to your PC via a USB 1.1 port, which is more than 10 times slower than ATA/133—the most current IDE hard drive technology.

Third, most motherboards have problems booting from USB devices. Booting from USB really only works with newer motherboards. If your mobo is more than a year old, chances are it won't boot.

Fourth, there are lots and lots of ways to set up multiple OSes on a single hard drive. Boot managers, like the NT Loader (which comes with Windows NT, 2000, and XP) and LILO (which is a part of most Linux distributions) are easy to use and will perform much better than CompactFlash cards.

Trouble with Toolbars

A month ago, I let my nephews use my home PC to check their e-mail on MSN. Little did I know, they were receiving e-mail containing material intended for, let's say, mature audiences. One of the links they clicked added a toolbar to my Views >Toolbars called "Adult Links." I would like to remove it, but I can't find any help on this topic in Windows XP Personal Edition. Do you have any advice?

—DARRIN MEALIO

Lucky for you, we were able to find a fix for the damage your "nephews" did. After digging around the net for a bit, we found this page: www.doxdesk.com/parasite/AdultLinks.html. At the bottom of the page are detailed instructions explaining what Registry keys and files you need to delete to get rid of the incriminating toolbar entry. If you want to avoid this sort of trouble in the future, try *Mozilla* (www.mozilla.org). It's much better behaved, and won't let nasty programs like *Adult Link* or *Gator* take over your browsing.

How Much IDE is Too Much?

I've got a Dell computer 8100. It's got two hard drives, one floppy, one CD, and one CD-RW drive. I want to add a DVD/CD-RW drive, the problem is that I can't find a cable that will connect to all the CD and DVD drives. I've talked to Dell numerous times; I'm told I would have to eliminate one of my drives. I asked why the computer comes with a spare bay and power cable for another drive but no cable to operate it. Dell doesn't have an answer. Is there anything you can give me?

—TIM BOWN

Most motherboards, especially the type sold by Dell and other mainstream vendors, support just four IDE devices. They include two IDE chains with two devices per chain. The easiest way to add your DVD/CD-RW drive is to remove one of the hard drives or the CD-ROM drive, then put the new DVD/CD-RW drive in its place.

If you find it absolutely necessary to keep all four of your existing drives, and you have a free PCI slot, you can add a stand-alone IDE controller. You can grab a Promise Technology Ultra 133 TX2 for about $50, which should do what you need.

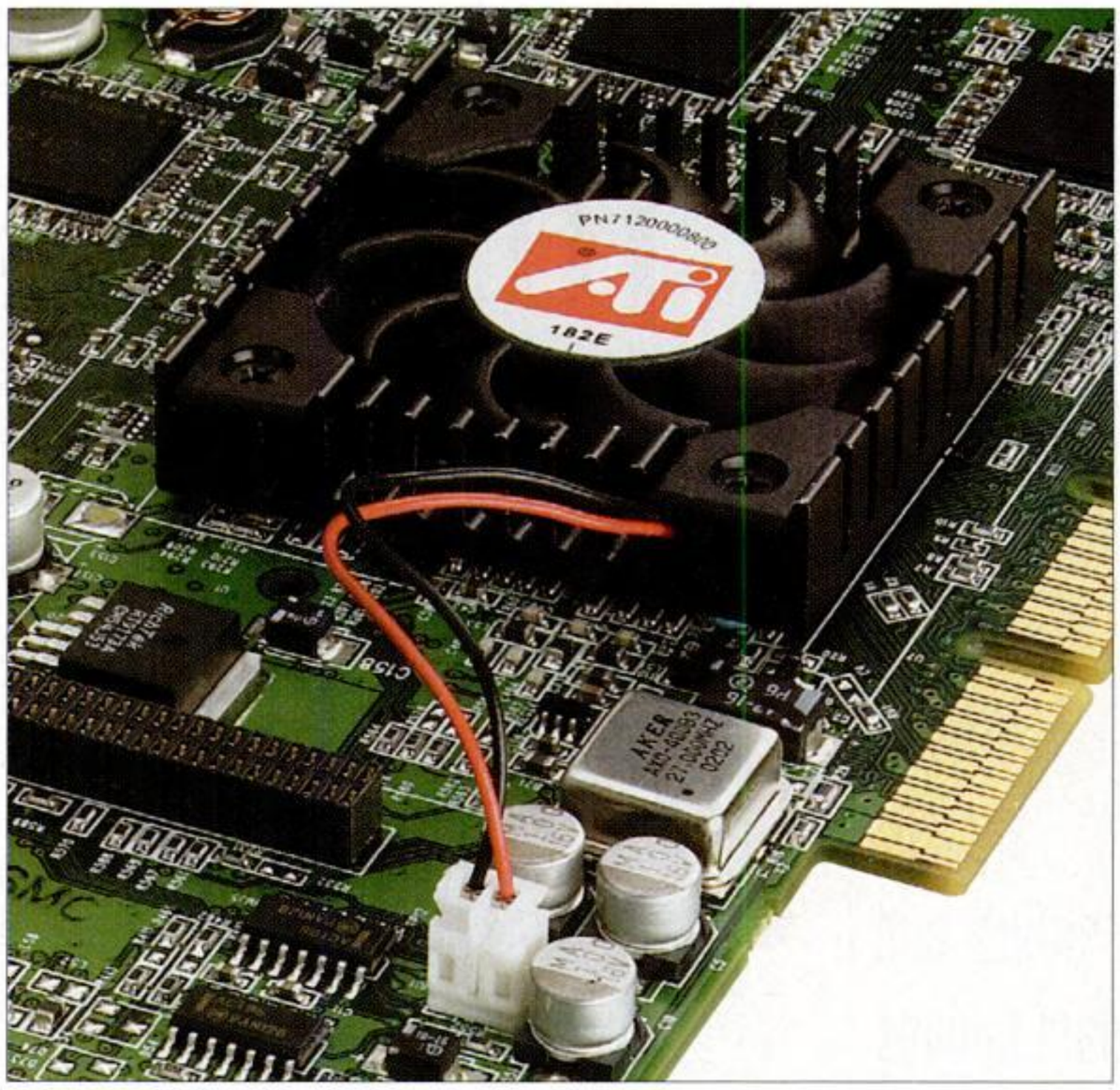
Klipsch Conundrum

I recently purchased the Klipsch GMX-D5.1 speakers from Alienware. Now I'm having problems getting optimum output from these speakers as they're digital and work differently than typical analog speakers. I have a Sound Blaster Live 5.1 Platinum soundcard. Can I get a detailed guide describing the proper way to install these speakers?

I've e-mailed Klipsch about this matter, but haven't received sufficient advice. Please help!

—BOI222

We covered this in last month's review of the speakers, but we'll rehash it here. The new Klipsch GMX-D5.1s were designed primarily for console gamers and include only digital 5.1 support. For PC gamers, this setup sucks, because most soundcards can send only a PCM stereo signal digitally. If you want to get 5.1 sound out of your GMX-D5.1s you'll need an nForce motherboard or a soundcard that can output a Dolby Digital 5.1 stream. Unfortunately, no Sound Blaster products can do that now. Your GMX-D5.1s are essentially 2.0 speakers unless you have a properly outfitted soundcard.



Most current 3D accelerators include easy-to-remove heatsinks, like this one.

Upgrade My Heatsink, Dag Nabbit!

I need to know how to remove the heatsink and fan from my videocard. The card is an nVidia GeForce2 GTS. The problem is that the heatsink looks like it's glued on; it's not attached with little fasteners. The other problem is that the wire from the fan looks like it's soldered or glued to the board. Will I damage the card if I pull off the wire? I bought a chipset cooler pack, which came with a heatsink and fan, but no instructions.

—LESLIE CHAVERA

You're probably out of luck, Leslie. Most of the time, heatsinks are glued to the chip with something that just won't come off. We've heard of people who have put the card in the freezer, and then, once frozen, successfully popped off the heatsink. We haven't personally tried it though, and applying any kind of force to your GPU could cause permanent damage.

If your fan's wires are soldered to the board, you need to first remove the solder using either a wick or a solder sucker, then reattach the new fan to the same leads.

(Just pulling them could cause permanent damage to your board.)

If you want to upgrade your video cooler, make sure your current cooling system is attached with pins and a fan connector that will be easy to remove (see above picture for an example). ■

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How To...

A step-by-step guide to tweaking your PC Experience

PROTECT YOUR WIRELESS LAN

BY WILL SMITH

There are snoops, sniffers, and data thieves in your neighborhood. Here's how to protect your 802.11 network.

Every month, you pay five sawbucks for a broadband Internet connection, and your favorite way to savor the lightning-fast downloads is via a wireless Internet connection. But danger lurks in this high-speed, free-range utopia. Just consider how many seedy online guides explain how to get "free broadband" by leaching off someone else's precious Wi-Fi bandwidth!

MAXIMUM PC
TIME TO COMPLETION
00:42
HOURS MINUTES

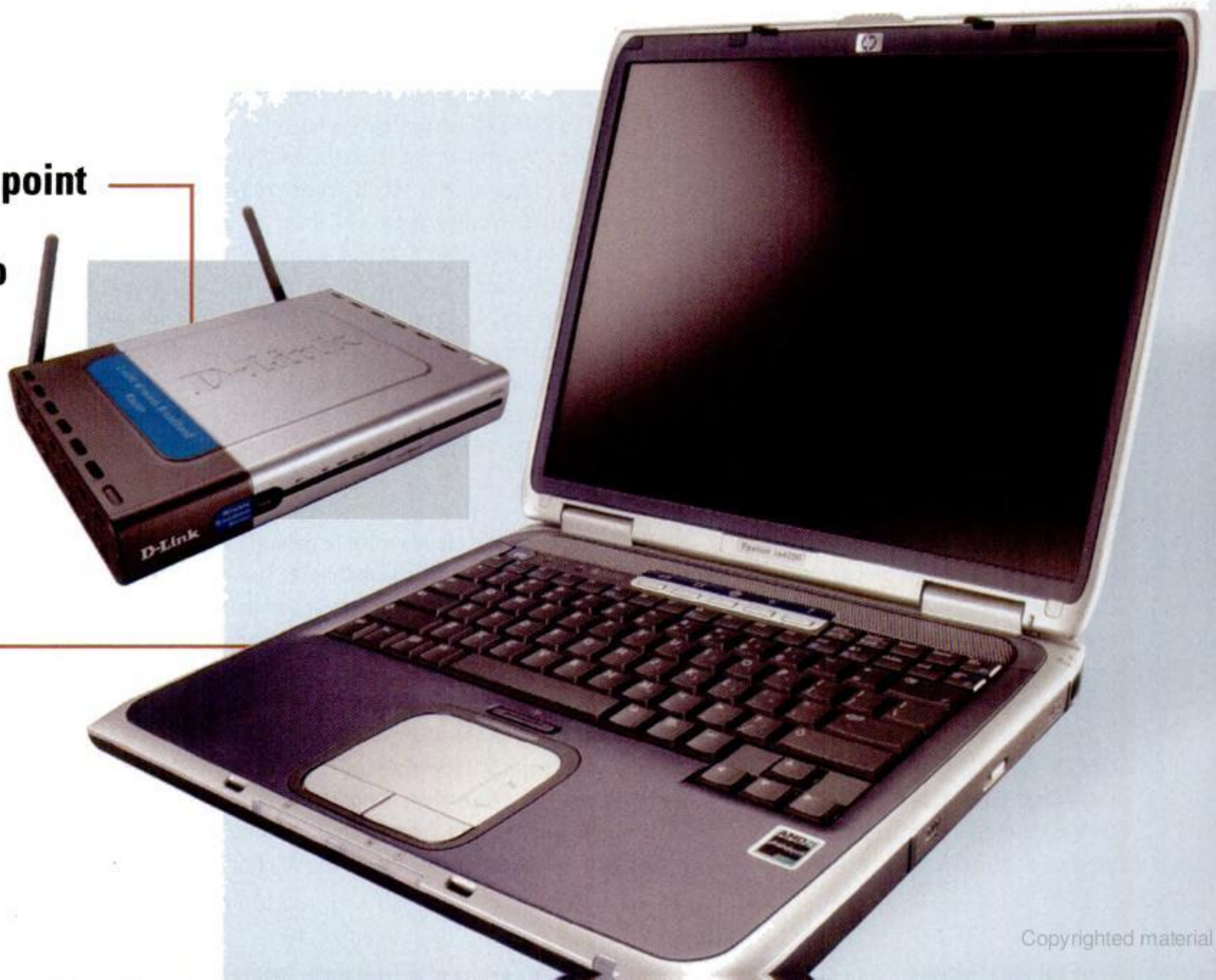
Stolen bandwidth isn't the only problem. Once thieves can leech your net connection, they can also get access to files on your PC, track the sites you browse, and even read your private e-mails and instant messages. Yikes! *It sucks to be you.*

But that's where we come in. We're here to save you from bandwidth pirates and other pimply ne'er-do-wells. Whether you use 802.11b or 802.11g, the precautions for wireless safety are about the same. We'll show you how to lock down your data and minimize the chances that wireless snoopers will leech from your LAN.

Wireless networking entails that every data packet to and from your PC be broadcast over the airwaves, so there's always a chance that someone will be able to sniff your data. If you want to make your LAN 100 percent secure, you'll have to disconnect it from wireless technology entirely. Still, the tips in this article will protect you from all but the most determined miscreants.

What You'll Need

- **802.11b or 802.11g access point**
- **802.11b or 802.11g cards to access the LAN**
- **100Mbit Ethernet hub**
- **NetStumbler (www.netstumbler.com)**
- **Laptop computer**



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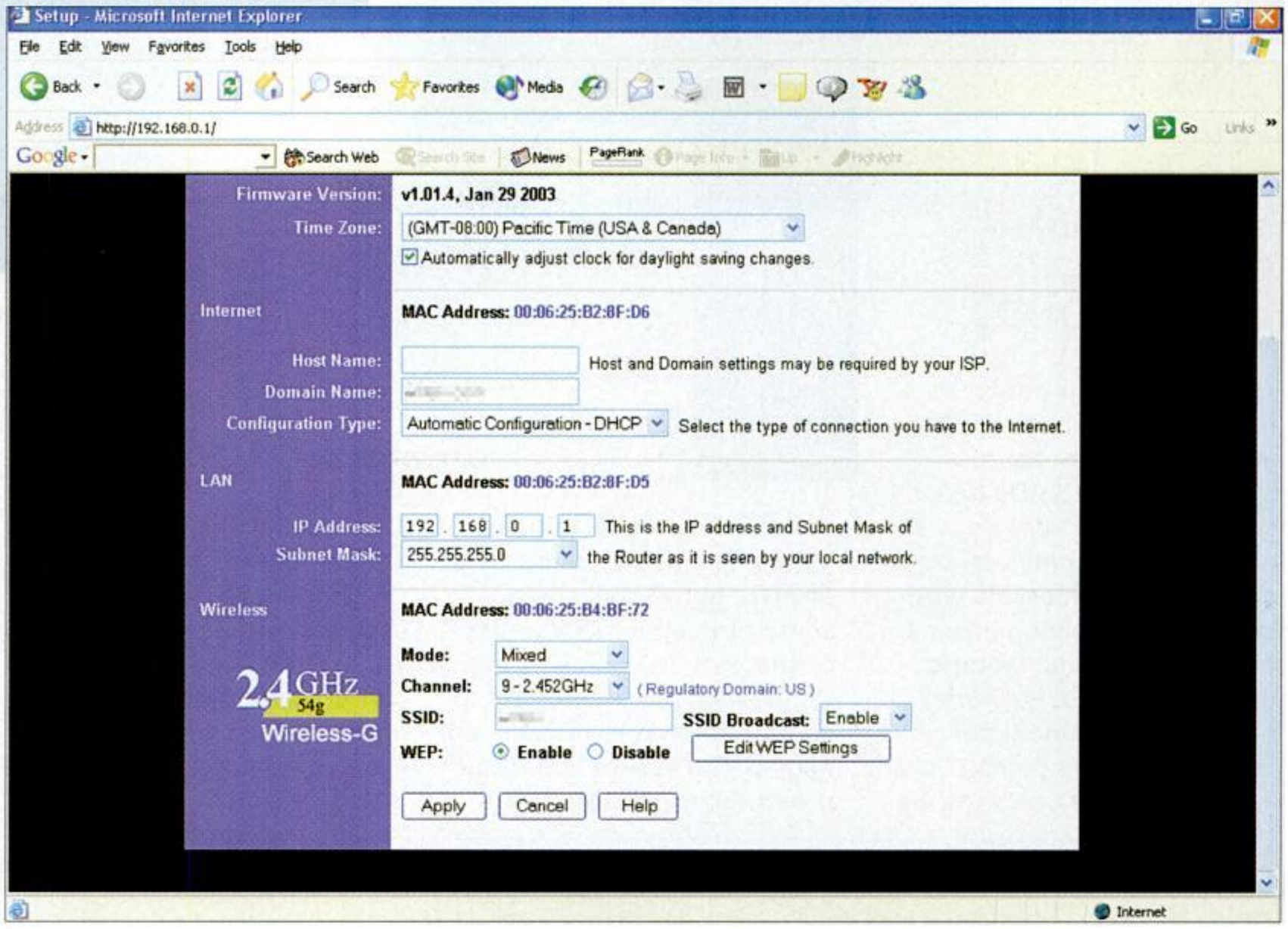
Give Your Network a New Name


Setup - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://192.168.0.1/
Go Links
Google Search Web News PageRank
Firmware Version: v1.01.4, Jan 29 2003
Time Zone: (GMT-08:00) Pacific Time (USA & Canada)
Automatically adjust clock for daylight saving changes.
Internet
MAC Address: 00:06:25:B2:8F:D6
Host Name:
Domain Name:
Host and Domain settings may be required by your ISP.
Configuration Type: Automatic Configuration - DHCP
Select the type of connection you have to the Internet.
LAN
MAC Address: 00:06:25:B2:8F:D5
IP Address: 192 . 168 . 0 . 1
Subnet Mask: 255.255.255.0
This is the IP address and Subnet Mask of the Router as it is seen by your local network.
Wireless
MAC Address: 00:06:25:B4:BF:72
2.4GHz 54g Wireless-G
Mode: Mixed
Channel: 9 - 2.452GHz
(Regulatory Domain: US)
SSID:
SSID Broadcast: Enable
WEP: Enable Disable
Edit WEP Settings
Apply Cancel Help
Internet

Your network's name can actually be a weak spot. In order to gain access to your network, an intruder has to know its name—commonly called an SSID. Most access points from a single manufacturer ship with the same SSID (preset at the factory) and the easy setup programs that come with the hardware don't always encourage users to change the SSID.

What can you do to fix this? Change your network's SSID! Open up the configuration program that was provided with your access point, and change the SSID to something completely unique and obscure. We recommend that you *not* use anything obvious, such as your hardware manufacturer's name, or words like "default," "wireless," "802.11," "network," "home," or anything else that may be easily guessed after just a few tries.

While you're changing the SSID, make sure to change the password for your APs administration account. No matter how secure you make your AP, it's wide open if a cracker can just log in using the username and password printed in the instruction manual.

Changing your SSID is the first step you need to take, but it's certainly not the end of your lockdown routine.

Get WEP Working

Enabling WEP—wired equivalent privacy—is the second-most important thing you can do to stymie would-be wireless freeloaders. WEP isn't 100 percent secure, but cracking the encryption technology isn't a simple exercise. In fact, it presents more trouble than most common bandwidth thieves are willing to wrestle with.

First things first: If your access point and your Wi-Fi card support 128-bit encryption, use 128-bit encryption. A 128-bit key can indeed be cracked, but even under perfect circumstances, a cracker will have to sniff packets from your wireless network for six or more hours in order to get enough data to generate a WEP key. And we repeat: That's in an *ideal* situation. It can actually take days or longer to sniff enough packets to crack a 128-bit key.

Of course, a 128-bit key won't help you if it's just 1111 1111 1111 1111 1111 1111 11. Interfaces for entering keys will differ from access point to access point. Some APs require that you enter the key in hexadecimal, while others prefer plain ASCII text. Luckily, the Windows wireless control panel lets you enter your key in either format, so make sure you enter the key in the same format in both places!

Wireless Network Connection Properties
Wireless Network Properties
Network name (SSID):
Wireless network key (WEP)
This network requires a key for the following:
Data encryption (WEP enabled)
Network Authentication (Shared mode)
Network key:
Key format: Hexadecimal digits
Key length: 104 bits (26 digits)
Key index (advanced): 0
The key is provided for me automatically
This is a computer-to-computer (ad hoc) network; wireless

When you create your key, remember that hex keys can include the digits 0 through 9 and A through F. ASCII keys can be any letter of the alphabet or any number. For maximum security, avoid repetition or any kind of pattern.

You Gotta Keep'em Separated

Now that your access point is reasonably secure, it's time to separate your networks. By separating them, you'll deny access to your wired LAN even if a cracker manages to break into your wireless LAN. The separation process involves getting a second hub and a second IP address from your ISP, and then setting up a firewall on your wired network.

First, you'll need to rewire your wired network. Connect your new hub to your DSL or cable modem, then connect your wired LAN to one port on the hub and your access point to another port. Next, configure your access point with the new IP address. Now you have two separate networks—one wired and one wireless—running off the same broadband modem. Of course, none of this will do any good if you don't have a firewall on your wired LAN, so make sure you at least have *ZoneAlarm* running on your router.

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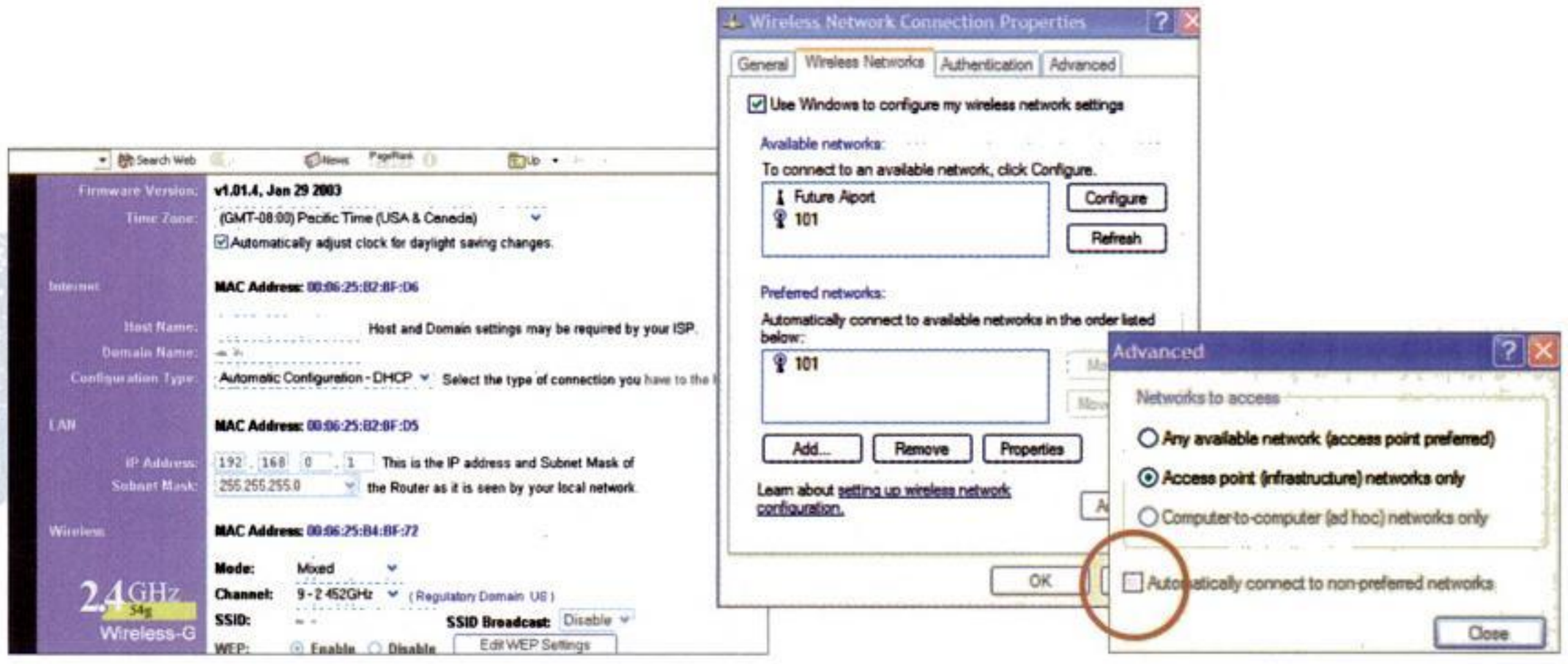
Disable SSID Broadcasting



The SSID is your network's name. By default, most access points are set to broadcast their SSIDs to a compatible Wi-Fi device in the vicinity. So not only can crackers discover vulnerable wireless LANs by driving around with Wi-Fi enabled laptops, they can also get network names at the same time!

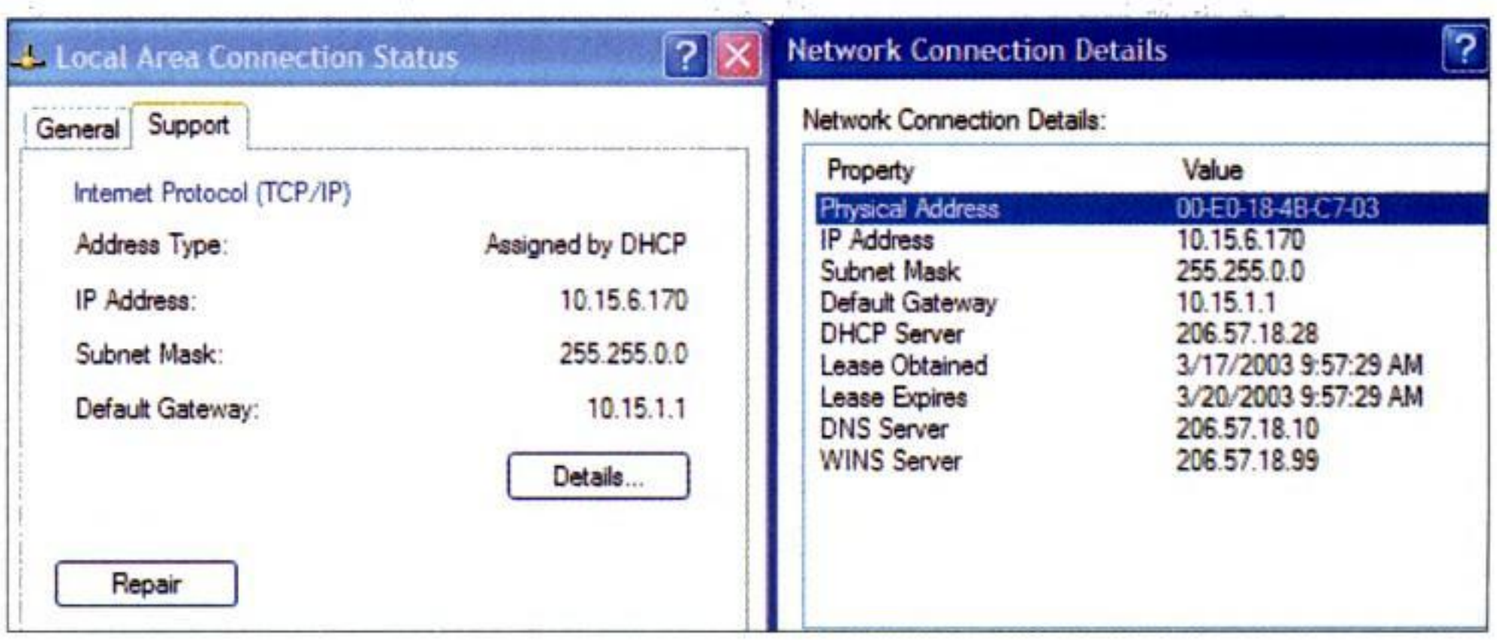
Most access points, however, include an option to disable SSID broadcasting. It's generally a good setting to disable, but we have had some problems maintaining connectivity when using the Windows built-in wireless configuration interface to connect to Wi-Fi LANs with SSID broadcasting disabled. And this problem is exacerbated if other people in your neighborhood have wireless LANs set up.

If you're noticing interference after disabling SSID broadcasting, there's a setting you can change to minimize the problem. Right-click My Network Places and select Properties. Now right-click your specific wireless connection, and select Properties. Go to the Wireless Settings tab, and select the Advanced option. Uncheck the "Automatically connect to non-preferred networks" option.

Super Security

Most access points are able to deny wireless access to unknown computers. You see, each network card has a unique number assigned when it's manufactured. This "MAC address" is a 12-digit code, and no other piece of network hardware will share the same code. By telling your wireless LAN to grant access only to network cards that have known MAC addresses, you can prevent unknown users from gaining entry.

Each AP will handle MAC address filtering differently, so you'll need to consult your instruction manual. The Linksys interface is pictured above. Just remember, any time you want to add a new authorized user to your wireless LAN, you'll have to get the MAC address, go into your access point's configuration screen, and manually enter it.

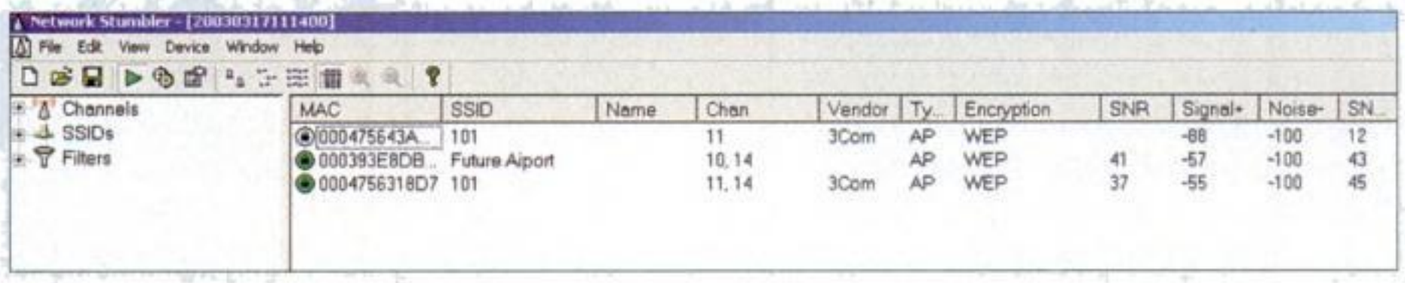


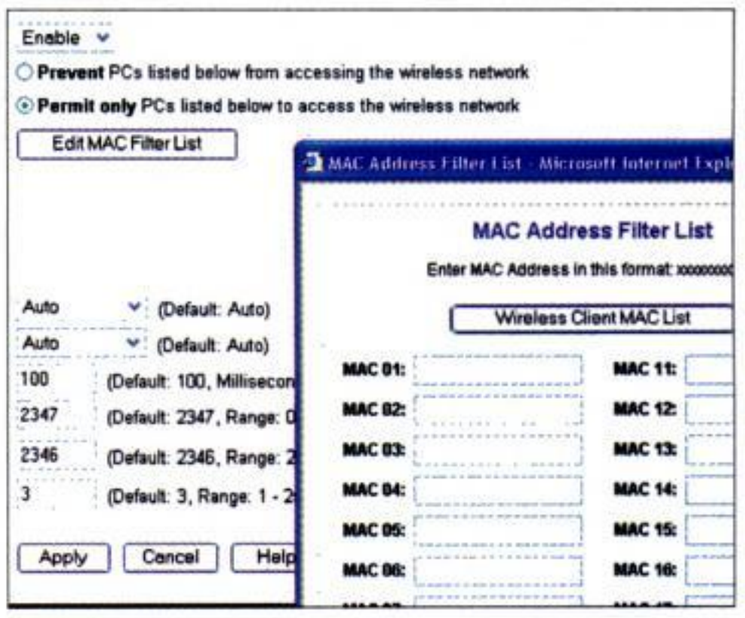
To get the MAC address from a Windows XP system, right-click My Network Places and select Properties. Next right-click your wireless network connection and select Status. Go to the Support tab, and press Details. The MAC address is labeled Physical Address in the window that pops up.

Check Your Back

If you've followed all our instructions, your wireless LAN should be **reasonably secure**. If the National **Security** Agency wants into your wireless **LAN**, there's **not much you can do** to **stop** it, but **our** tips should keep little **Billy** next door from using your DSL **line** to download gigabytes of Trent Reznor MP3s.

Regardless, you should **still install** *NetStumbler* (**www.netstumbler.com**) **on one of your wireless PCs, and see if your LAN shows up. *NetStumbler* is the most common 802.11 network sniffer. Most likely, it's what your enemies will be using to discover and compromise your LAN. If you configured everything correctly, your access point shouldn't even show up in this utility's window. If you don't see it, the freeloaders probably won't either, and will just move on to easier prey.** ■




Enable
Prevent PCs listed below from accessing the wireless network
Permit only PCs listed below to access the wireless network
Edit MAC Filter List
MAC Address Filter List
Wireless Client MAC List
Apply
Cancel

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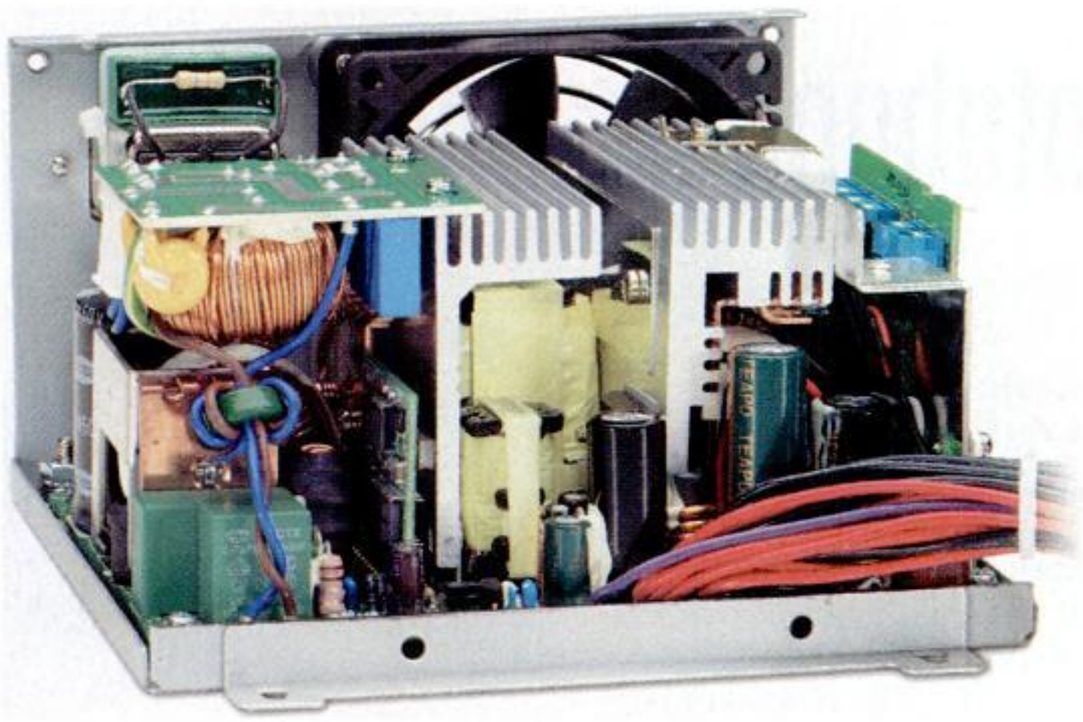
The Inside Story on Power Supplies.

Turbo-Cool® 510



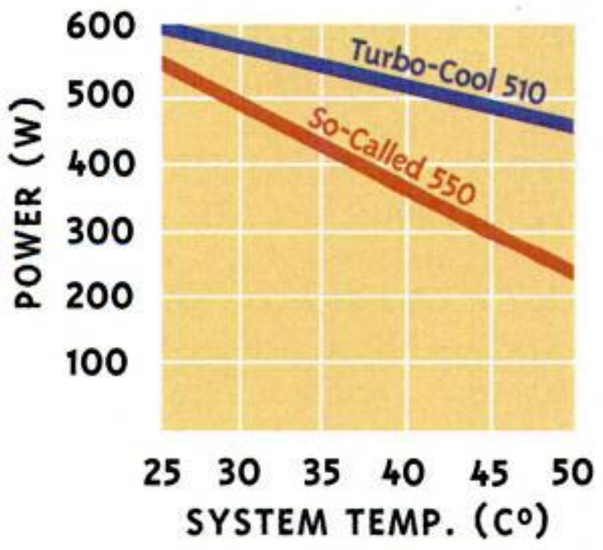
So-Called 550

Power @ 25°C:	**600W**	**550W**	Rating requires room temp. < 60°F
Power @ 40°C:	**510W**	**366W**	40°C is the temp. inside a typical PC
Power @ 50°C:	**460W**	**244W**	50°C is the spec for an industrial PC
+12V Output:	**34A**	**24A**	Powers the processor(s) and drives
Regulation:	**1%**	**5%**	Maximum voltage fluctuation
System Cooling:	**44 cfm**	**40 cfm**	Tests show second fan is ineffective
Active PFC:	**Yes**	**No**	Continuous range line conditioning
Voltage Pots:	**Yes**	**No**	Adjustments for system imbalance
Intel Approved:	**Yes**	**No**	Turbo-Cool 510 tops Intel's ATX12V list
Warranty:	**5-Years**	**1-Year**	Reliability and longevity indicator

Turbo-Cool® 510 is the Expert's Choice.

Turbo-Cool power supplies have powered Maximum PC's Dream Machines for the last five years and are recommended by motherboard manufacturers such as Asus, SuperMicro, Tyan, and Intel.

Don't be Mislead by Wattage Claims!



*Even though the ambient temp. inside a loaded PC is at least 40°C (104°F), most manufacturers unrealistically assume 25°C (77°F) in order to exaggerate their wattage claims. Since the proper full-load rating is 15°C higher, these power supplies produce **33% less power** than their advertised ratings as shown on the derating chart.*

Turbo-Cool 510 derating spec: *full load @ 40°C, decrease to 90% load @ 50°C.*
So-Called 550 manufacturer's spec: *full load @ 25°C, decrease to no load @ 70°C.*

PC POWER & COOLING, INC.

High-Performance Computer Power Supplies Since 1985

www.pcpowercooling.com • 5995 Avenida Encinas, Carlsbad, CA 92008 • (760) 931-5700 • (800) 722-6555

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In the Lab

A behind-the-scenes look at Maximum PC testing

Let's Benchmark Some Notebook Graphics!

Tit-for-tat, butter for fat, ATI's dog kicks nVidia's cat

The ATI mobile/desktop Franken-traption did beat nVidia's finest desktop part in some key benchmarks.

You'd think that cross-sniping would have left both ATI and nVidia breathless by now. But, oh no, each company is still full of enough piss and vinegar to fight for graphics supremacy. This episode of "In the Lab," however, concerns not the desktop 3D war, but rather what's happening inside notebooks. Both companies have announced mobile graphics chipsets with DirectX 9 support, and promise speed that's damned close to that of the best desktop GPUs.

nVidia's high-end part is the GeForce FX Go 5600. It'll thrust and parry with a 350MHz core and a 350MHz DDR memory clock. Very similar to the desktop GeForce FX 5600 Ultra (nVidia's midrange part, not to be confused with the 5800 Ultra), the mobile version adds improved PowerMizer 3.0 management. And, thanks to its 0.13-micron process, it's perfectly suited for hot, steamy, electrically modest mobile environments.

ATI counters with the Mobility Radeon 9600 Pro, a right impressive part considering the company's history. Even when nVidia dominated the performance desktop space—a position it no longer owns—ATI was the mobile graphics king. In fact, the company trumped nVidia last year when it released the Mobility Radeon 9000, the world's first DirectX 8.1 mobile part, complete with programmable shaders. The 0.13-micron Mobility Radeon 9600 Pro runs a 350MHz core and 300MHz memory, and is based on the desktop Radeon 9600 part

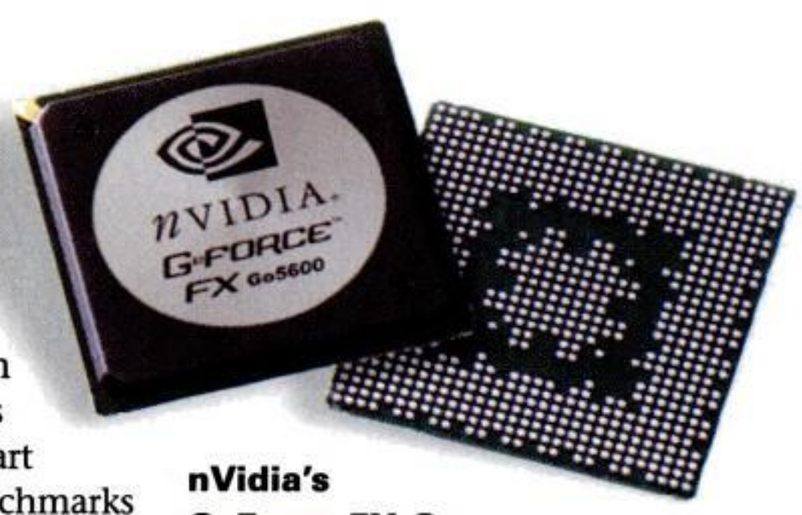
We didn't get a chance to test nVidia's GeForce FX Go 5600, but ATI was kind enough to let us tinker with a sample Mobility Radeon 9600 sitting on an AGP card. This sample was not the "Pro" version of the new mobile GPU, and was running just a 300MHz core and 250MHz memory. Testing mobile graphics power in a desktop PC is uncharted territory, but we figured, "What the hey, this is just a preview—we'll get real mobile parts soon enough."

Using a 3GHz Pentium 4 and 512MB of DDR333 stuffed into an SB51G Shuttle box, ATI "simulated" the config of a high-end gaming notebook. When we benchmarked the proxy rig, ATI asked us to compare the Mobility Radeon 9600 with a top-of-the-line GeForce FX 5800 Ultra desktop card running at 500/500MHz DDR.

ATI says it expects to legitimize user upgrades of notebook graphics with its Mobility Radeon 9600 Pro part.

The ATI reps said they didn't even care if our GeForce FX 5800 Ultra was running on a dual-channel RDRAM motherboard, because the Mobility Radeon 9600 would still be competitive.

We told the ATI folk that their proposition was intriguing, but declined in favor of more controlled head-to-head testing at a future date. But we can tell you that the ATI mobile/desktop Franken-traption did beat nVidia's finest desktop part in some key benchmarks ("some" being the operative word—the GeForce FX 5800 Ultra won the majority of our impromptu tests).



nVidia's GeForce FX Go 5600 will go up against ATI's Mobility Radeon 9600 Pro.

Still, ATI's test rig did indicate that the Mobility Radeon 9600 will be the fastest mobile GPU ever created once it's ready for deployment.

In *3DMark2001 SE*, we saw the chip hit 10,699 3DMarks. In *3DMark2003*, it spit out 3,137 3DMarks. We also ran our standard *Quake III Arena* test with 4x AA turned on, and we were duly impressed with a score of 67.5fps. All of these scores easily leapfrog the results we got from a Dell Inspiron 8500 sporting a GeForce 4 4200 Go.

The Pro version of the Mobility Radeon 9600 will feature a thermal sensor to let the chip automatically over- and underclock itself. The chip essentially runs as fast as it can, and if it detects overheating, it throttles back.

ATI also says it has finally reached the Holy Grail of notebook graphics: an upgradeable part. For example, if you buy a notebook with integrated graphics (care of ATI's 7000IGP chipset), and your notebook manufacturer supports upgrades, you should be able to buy a Mobility Radeon 9600 Pro and slap it in. ATI says upgradeable notebooks will be available later this year, and Mobility Radeon 9600-equipped notebooks should be ready by the time you read this. Pro versions of the mobile GPU are scheduled for this summer.

nVidia says GeForce FX Go 5600 notebooks should be available by the time you read this, as well. When we're able to test both parts in comparable notebooks, we'll let you know which one is fastest.

MOBILE GPUs AT A GLANCE

	ATI Mobility Radeon 9600 Pro	nVidia GeForce FX Go 5600
Code-name	M10	NV31M
DX 9 support?	Yes	Yes
Process	0.13-micron	0.13-micron
Core	350MHz	350MHz
RAM	300MHz, 128MB max GDDR2M	350MHz DDR, 256MB max
Effective bandwidth	54.4GB/s	22.4GB/s

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GearGrip Micro Computer Harness & GearGrip LCD Shield Harness

A mini PC and LCD flat-panel may be the perfect tools for a LAN party, but they're still not easy to carry. But with Case Ace's new GearGrip Micro Computer Harness and GearGrip LCD Shield Harness, you can sling your entire system over both shoulders and keep your hands free to carry the pepperoni pizza.

The GearGrip Micro has a compartment to store cables, a mouse, some CDs, and most keyboards, and can fit both cube- and rectangular-shaped mini PCs. The GearGrip LCD Shield Harness features a shield that protects your delicate LCD surface from scratches and punctures. The LCD harness runs $39 while the computer harness runs $35. More details are available at CaseAce's web site: **www.geargrip.com**.

Armor Plated DVDs: Do They Work?

We put scratch-resistant media to the test

TDK says that its new "Armor Plated" recordable DVDs provide "100 times greater resistance to damage" than traditional discs, thanks to a hard coating over the disc surface that rebuffs scratches, repels ink, and is even antistatic. But does it work? We think it does.

We deliberately sabotaged a number of Armor Plated discs in order to replicate some of the boneheaded things we sometimes do by accident. For example, we wrote on the "wrong side" of a disc with a permanent black Sharpie pen. The result? Every bit of ink slid right off when we rubbed the disc with a napkin. Spooky.

There's no question that the Armor Plated discs were far more resistant to scratches than normal media, and the scratches that did appear were extremely thin and didn't prevent us from accessing our data. Non-Armor Plated discs, meanwhile, showed wide scratches with smeared edges, and the discs were rendered useless after just a few minor nicks.

TDK says the price increase for the armor will be "nominal." Of course, if you're paranoid about scratching delicate DVD recordable media, any price for the armor plating may be worth it. Our verdict? Thumbs-up to TDK's tough media. It should be available in electronics stores this summer in 4x +R and –R formats.

Best of the Best

As of May, 2003

Here are our current top picks for each hardware category. Red text indicates first month on chart. Check back next month for updates.

High-end videocard:
Hercules 3D Prophet 9800 Pro

Budget videocard:
ATI Radeon 9500 Pro

Do-everything videocard:
All-in-Wonder 9700 Pro

Soundcard:
Sound Blaster Audigy 2 Platinum

Hard drive:
Western Digital 360GD Raptor

CD-RW drive:
Plextor PXW4824TA/BPS

DVD burner:
Sony DRU-500A

LCD monitor:
Sharp LL-1820

CRT monitor:
Sony F520

P4 motherboard:
Asus P4T533-C (still waiting for 875P motherboards)

Athlon XP motherboard:
Asus A7N8X Deluxe

Portable MP3 player:
iPod 20GB

Photo printer:
Epson Stylus Photo 1280

Pocket PC PDA:
Toshiba e740

5.1 speakers:
Logitech Z-680

4.1 speakers:
Logitech Z-560

2.1 speakers:
Klipsch Promedia 2.1

The games we're currently playing: *SimCity 4, Battlefield 1942: The Road to Rome, Tom Clancy's Splinter Cell, Unreal II The Awakening*

Rejected!

Every month, we present the world's best case mods on the last page of the magazine. But what about the rejects? Here are some mods that didn't make it past the judging panel.

The Hoops PC

When 14-year-old Mike Rotch of Kenosha, Wisconsin, wanted to mod his PC, he started with something he thought no one had ever seen before. Mission accomplished, Mike! We've never seen such a thing! (We've also only recently become aware of a televised singing competition that's apparently quite popular.)

The Pay PC

Configured by Anthony Hole of Rapid City, South Dakota, the Pay PC was created for freeloading relatives who come over to download MP3s because Anthony's connection "is so much faster." The USB-powered reader accepts both dollar bills and the new Sacagawea coin.

The Case Cozy Mod

Jacques Strape of Moose Jaw, Canada, says on cold, cold winter nights, his problem isn't cooling his CPU, but keeping his case warm enough to prevent condensation and shattered hard drive platters. So Strape knitted this case cozy using a "double increase" method.

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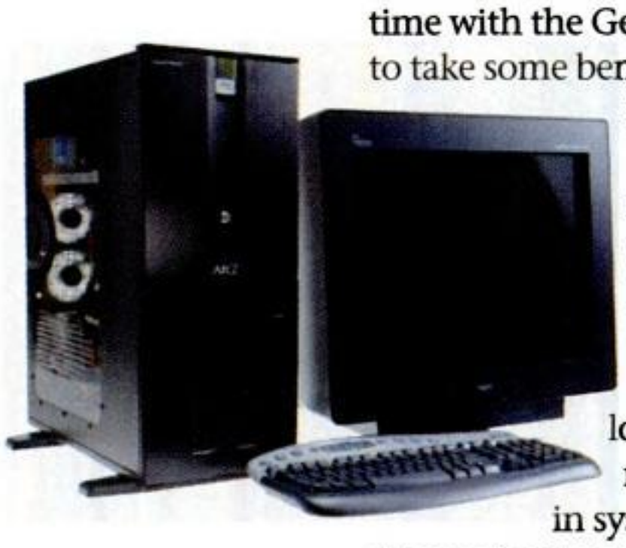
ABS Ultimate M6

Not the component config we'd build ourselves

The ABS Ultimate M6 packs a GeForce FX 5800 Ultra videocard.

Last month Falcon Northwest was about to send us a system with the new nVidia videocard, but we opted to receive Falcon's Mach V Exotix with a Radeon 9800 Pro instead. We had already spent some time with the GeForce FX, and wanted to take some benchmarking stabs at the ATI card.



Thus ABS made real our first "OEM approved" GeForce FX experience—and the machine didn't perform poorly in the lone gaming benchmark that we include in system reviews (we dropped our custom *Jedi Outcast* benchmark in January because of incompatibility problems with Intel's Hyper-Threading). In fact, the FX-powered M6 system yielded a heady 88fps in Game 4 of *3DMark2001 SE*, a next-gen, programmable shader test.

Not all is just as it seems, though.

In Game 4, the brute horsepower of the GeForce FX's 500MHz core rules, but that doesn't make the videocard the fastest 3D accelerator available. In fact, in last month's Head2Head department, we concluded that ATI's Radeon 9800 Pro is the faster of the two technologies—and doesn't drone on and on like an ugly drunk. Maybe ABS shares the same opinion. At press time, ABS was pushing the Radeon 9800 Pro on its web site.

The M6 does indeed have a noise problem, and we're not talking about the soft whir emanating from the rig's generous battery of five 80mm fans. No, we're talking about the annoying high-frequency, high-velocity, small diameter fan sound that has you climbing the walls like a battered POW after 10 months in a bamboo cage. We usually don't comment on system noise unless it's abnormally silent (like Dell's Dimension 8250) or annoyingly loud. High-performance often has some strings attached. But the FX card in the Ultimate M6 spurs us to grouse. It's that grating.

If you can ignore the noise of the GeForce FX, the Ultimate M6 is actually a pretty nice box. Built into a Cooler Master ATC-710 case, it features an Athlon XP 3000+ with 1GB of Corsair Micro DDR333 RAM, a Lite-On 16x DVD-ROM, and a 4x NEC DVD+R/+RW drive. A 22-inch NEC FE2111SB monitor draws display duties—kudos to ABS for including a big, flat, aperture grille CRT instead of a flat-panel LCD.

But we just don't get the inclusion of the Audigy 2 soundcard. We love this card for its 24-bit, high-fidelity playback, but ABS also bundles the new Klipsch GMX D-5.1 speaker system (which received a 7 verdict in last month's issue). These speakers only support full 5.1 sound in digital mode—and the Audigy 2 (and most other 5.1 soundcards) sends just PCM Stereo to the digital output. So the Audigy 2 can't really reach its potential with the Klipsch system.

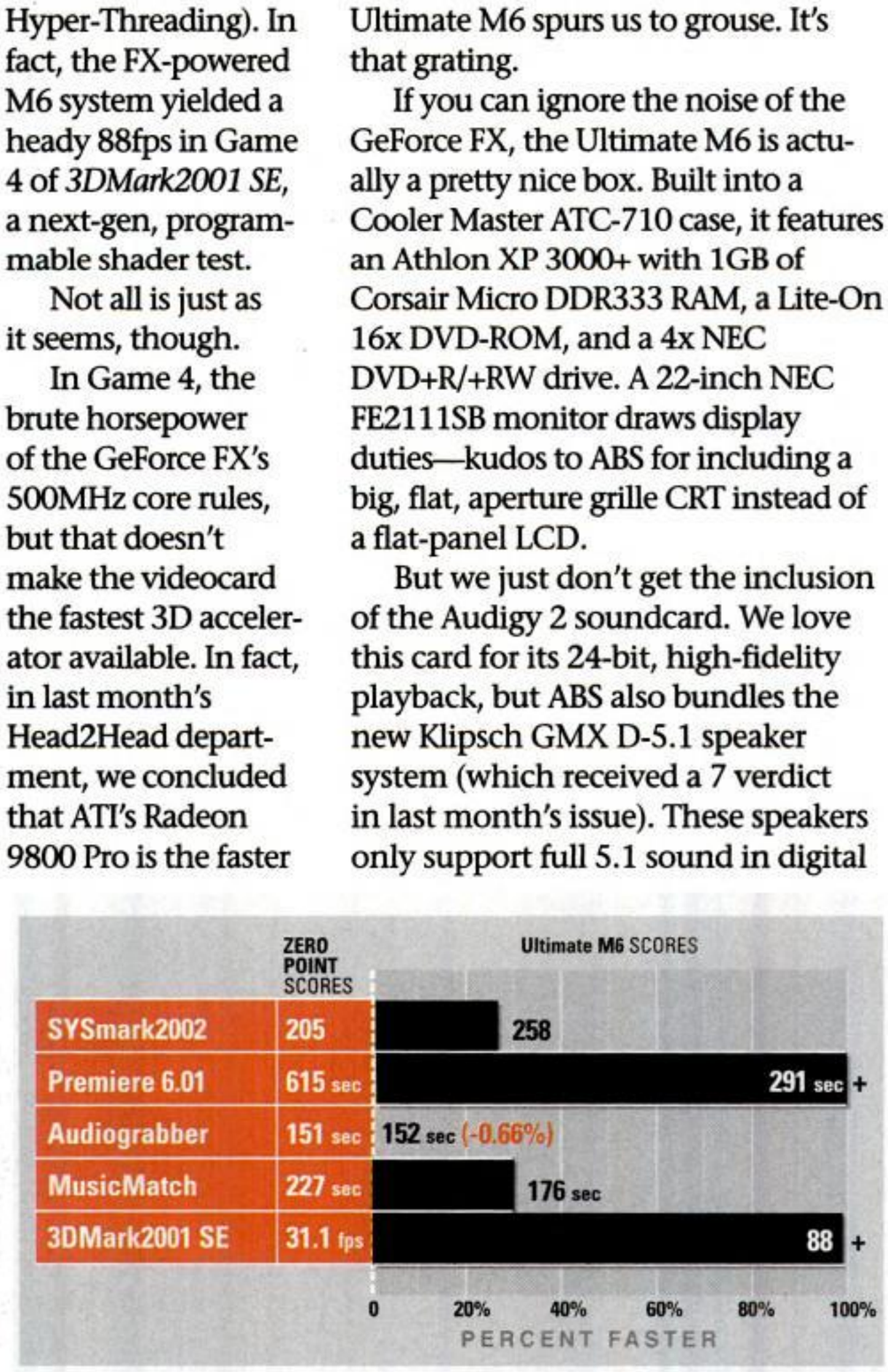
We liked the cool 7-in-1 media reader (which includes a floppy drive among other I/O options), and the rig didn't disappoint us in *SYSmark2002*. In this benchmark, the M6's 8MB cache WD hard drive kept up with the Falcon's RAIDed 2MB cache IBM drives. But of the three Athlon XP 3000+ systems we've tested, the Ultimate M6 was the slowest in our *Premiere* test, though not by much.

To improve the rig's overall config, we'd either swap out the Klipsch speakers for an all-analog 5.1 set, or ditch the Audigy 2 and get a mobo with the "Deluxe" version of the nForce2 chipset (which outputs digital 5.1 sound). We'd also opt for an ATI videocard over nVidia's latest, and do something about the mismatched color scheme of the components peaking through the front bezel. The M6 is a nice rig, and ABS's overall "out of the box" consumer experience is top-notch. We just don't like some of the component choices.

—GORDON MAH UNG

UNDER THE HOOD

THE BRAINS	
CPU	Athlon XP 3000+ (2.17GHz)
Mobo	Asus A7N8X (nForce2 chipset)
RAM	1GB PC3200 (DDR400) Corsair
I/O ports	Four USB 2.0, PS/2 mouse, PS/2 keyboard, Parallel port, one serial ports, VGA, DVI, three analog audio out, line in, mic in
LAN	Onboard 3Com, nVidia 10/100 Ethernet
DISPLAY	
Videocard	nVidia GeForce FX 5800 Ultra (500MHz / 500MHz)
Monitor	22-inch NEC FE2111SB (20-inch viewable)
STORAGE	
Hard drive	120GB Western Digital WD1200JB (8MB cache)
DVD-ROM	Lite-On 16x DVD-ROM
DVD burner	NEC ND-1100A (4x DVD+R, 2.4x DVD+RW, 16x CD-R, 10x CD-RW, 12x DVD-ROM, 40x CD-ROM)
AUDIO	
Soundcard	Sound Blaster Audigy 2
Speakers	Klipsch GMX D-5.1
FINE DETAILS	
Case	CoolerMaster ATC-710
Fans/extras	Five 80mm fans, case window with cold cathode light
Mouse	Microsoft Wireless Optical
Keyboard	Microsoft Wireless MultiMedia Keyboard 1.0A
BUNDLE	
Windows XP Home	
BOOT: 49 sec.	**DOWN: 6 sec.**



Our zero-point system includes: an Intel D850MV motherboard, a 2GHz P4 CPU, 512MB PC800 RDRAM, a GeForce4 Ti 4600 videocard, and a Western Digital 1000BB hard drive (2MB cache).

MAXIMUMPC VERDICT

Ultimate M6
ABS COMPUTERS

LUKE SKYWALKER
Athlon XP 3000+ still shines despite its hefty price. Nice CRT. Good overall packaging and build quality.

YOUNG ANAKIN SKYWALKER
Noisy GeForce FX 5800 Ultra had us climbing the walls. Sound subsystem is ill-conceived.

www.abspc.com
$3,450 (w/o monitor and speakers)

8

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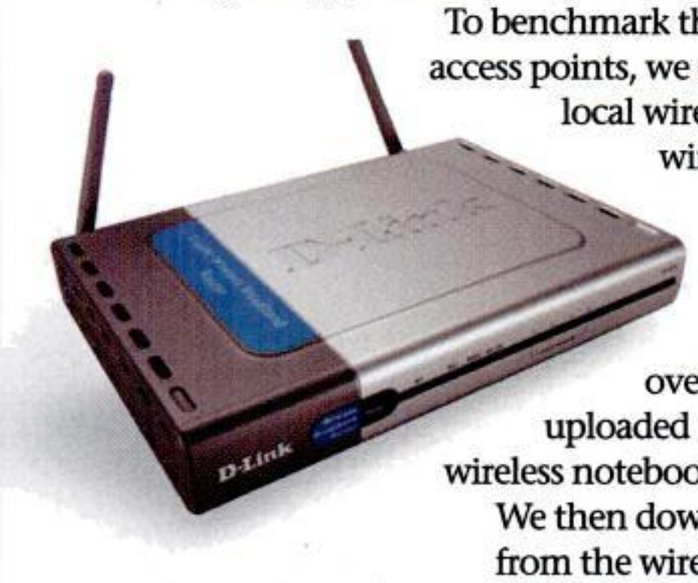
Ain't Nothin' But a G Thang, Baby...

What does 802.11g bring to the wireless networking party?

Wireless networking isn't particularly cool, but it's become a vital part of most *Maximum PC* editors' lives. Because we've become so reliant on 802.11b LANs at home and work, parts of us shrivel and die when we enter a Wi-Fi dead zone. That's why we were so excited to see the first batch of 802.11g equipment enter the Lab.

802.11g is an upgrade to the "b" spec. It operates in the same 2.4GHz spectrum as 802.11b, but its throughput is spec'd to hit 54Mbps to 802.11b's 11Mbps. The hitch is that the 802.11g spec isn't expected to be final until later this summer. Nonetheless, both D-Link and Linksys, whose access points are reviewed here, are promising fully compliant firmware upgrades when the spec is ratified.

Like some earlier Wi-Fi products, we found both access points to be insanely difficult to set up, especially if you enable WEP encryption—a necessity in today's world of Wi-Fi sniffers and data theft. We figure that if we had trouble during setup, your dear old grandad will have an aneurism.



4Mbps? Hah! We couldn't get the D-Link access point to move beyond 802.11b download rates.

To benchmark the performance of the access points, we connected them to our local wired LAN and set up two wireless clients and one wired client. Our first test measured the maximum throughput possible over a wireless link—we uploaded 101MB of files from a wireless notebook node to the wired PC. We then downloaded the same files from the wired PC to the wireless notebook. Our second test measured performance in a busier wireless environment: We repeated the tests, but used two wireless machines that share bandwidth on the wireless network. Files were transferred via FTP.

—WILL SMITH

D-LINK DI-624

Configuration and setup for both kits was hellish, but getting the D-Link up and running was definitely the more difficult proposition. Initial setup was deceptively simple. We plugged a PC into the D-Link's integrated Ethernet hub, and then set the machine to automatically obtain an IP address. We then fired up our web browser to configure the access point, but in using this "Easy Setup" option, we weren't able to get WEP (a wireless network security protocol) working properly. We were finally able to enable 128-bit WEP, but this required going into the manual security settings—an elaborate hassle.

Once we finally got the kit configured, the DI-624 performed poorly. We simply couldn't tell whether the access point was in 802.11g mode. No matter what we did, the cards we used to connect to the access point reported a mere 2Mbps connection speed to Windows. We were able to download our 101MB file from the wired computer in 84 seconds, which works out to about 9.7Mbps, far short of the 54Mbps promised by the 802.11g spec. Things got even uglier when we ran two machines on the same wireless LAN. Our download time increased from 84 seconds to a whopping 229 seconds. We expected a slower transfer when sharing one access point, but we didn't expect it to be *three times* slower!

On the plus side, the D-Link includes all the options that network admins will want to tweak, including router filters, a DMZ, and even the transmission delays on the wireless protocol.

The Linksys access point includes a router and four-port hub, but it's still more difficult to configure than it should be.

LINKSYS WAP54G

Linksys' 802.11g effort is a little better than D-Link's, but it was still a pain to get the WAP54G working, especially with WEP encryption enabled.

Linksys' configuration procedure is similar to D-Link's: Plug a PC into one of the built-in Ethernet ports, and then point your browser to a URL. Linksys' "easy" config was more effective than D-Link's, but we still had to delve into menus and manually tweak our WEP key length, SSID broadcasting, and some other features. Linksys also allows you to set a DMZ PC, or individually configure the ports on your router to pass incoming data to different PCs on your LAN.

Performance trumped the D-Link kit, but it still wasn't "five times faster than 802.11b." We downloaded our test files in 44 seconds from a wired PC, and 85 seconds from another PC on the wireless LAN. If you're just getting into wireless networking, and are looking for a router, the WAP54G isn't a bad place to start. Just be prepared to spend some time on the phone getting everything configured.

CROSS-COMPATIBILITY CHECK

Both access points worked with standard 802.11b cards, but by using them in 802.11b mode, you lose 802.11g support across the node. For that reason, we recommend you set your access point to 802.11g-exclusive mode, which will prevent passing 802.11b users from hurting your performance.

Faster is always better, but if you're just going to use one of these access points to share broadband through your home, 802.11b is more than fast enough to accommodate the maximum download speeds of most cable and DSL connections. If you've already got an 802.11b setup, wait until the "g" spec has matured a bit before upgrading.

DARE TO COMPARE: 802.11G ACCESS POINTS

	WIRED ACCESS POINT TO WIRELESS NODE		WIRELESS NODE TO WIRELESS NODE	
	Upload	Download	Upload	Download
D-Link DI-624	164 sec	84 sec	366 sec	229 sec
Linksys WAP54G	57 sec	44 sec	125 sec	85 sec

MAXIMUMPC VERDICT

DI-624
D-LINK

+ TUMS
The DI-624 has all the right ingredients from a features standpoint, and we love the integrated four-port hub.

– ROLAIDS
Too hard to set up and performance is alarmingly slow. The "Easy Setup" option doesn't work.

www.d-link.com
$150
6

MAXIMUMPC VERDICT

WAP54G
LINKSYS

+ THIN MINT
Faster than the D-Link kit, especially when more than one machine is connected to the wireless LAN. The integrated four-port hub will let you connect some non-wireless machines to the router too!

– LINT
Configuration was difficult. Linksys uses a default SSID for all its products, so make sure you change that as soon as you turn it on.

www.linksys.com
$130
7

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Monsoon PlanarMedia 14

Flat and oh-so-crisp. Mmmm... good speaker

Like all Monsoon speaker systems, the PM14s use flat-panel satellites and a subwoofer to produce great sound from a tiny little package. To create sound, traditional speakers modulate a single transducer, creating vibrations in a large paper cone. The problem with this strategy is that the entire cone surface is vibrated from a single, centralized point, and this can compromise sound quality.

The Monsoon satellites, meanwhile, use a ribbon transducer, which applies an even force to a relatively small diaphragm across the full length of the transducer. Because of its small mass, the Monsoon diaphragm moves much more rapidly than the diaphragm of a normal paper speaker cone. The result is that Monsoon's satellites produce particularly crisp sound in the high and midrange frequencies. On the downside, flat-panel speakers have traditionally had problems reproducing low-frequency sounds, and can't match the massive volumes produced by magnets and paper-cone speakers.

The latest Monsoon satellites still don't offer much oomph on the low-end, but they do sound great, and the entire system offers good volume for a flat-panel rig. Our 20Hz to 22kHz frequency sweep was flawless—there wasn't even a hint of a hiccup during the sat-to-sub crossover. The system's 8-inch, front-firing, ported sub is adequate for bass production at normal volumes in games and music.

The PM14 satellites produce a well-defined sound field, whether you're directly in front of the speakers or positioned at an off-axis listening point. The sound reproduction at normal listening volumes is super-crisp for highs and mids. We really can't stress this enough: These speakers are awesome at reproducing midrange sounds. Of course, the mid-goodness comes at a cost. As is common with flat speakers, the PM14s exhibited significant distortion as we approached maximum volume.

The Monsoon PM14s aren't just good *flat* speakers, they're good speakers.

If cranking your PC to 11 is your bag, then the PM14s aren't for you. Spend a few more bucks, and pick up some Klipsches. But if you're interested in a modest but still great-sounding 2.1 rig, then you've come to the right place.

⊕ **SENSORY DEPRIVATION:** Great sound quality at normal listening volumes. Control pod handily mounts under either speaker.

⊖ **OXYGEN DEPRIVATION:** Distorts as you approach maximum volume.

—WILL SMITH

MAXIMUM PC VERDICT: 9

$150, www.monsoonpower.com

Hewlett-Packard Pocket PC h1910

So little—yet so much to love

Palm PDAs have always kicked Pocket PC bootie in one key area: size. While Pocket PCs have traditionally offered far more power, they've never been very petite. But Hewlett-Packard's diminutive h1910 steers the PPC platform in a new direction. Weighing just slightly more than four ounces, the h1910 is roughly the size of the ancient Palm V—yet it boasts today's technology. There's an Intel XScale PXA250 200MHz CPU, 64MB of RAM, an SD slot, infrared, and a transflective screen that's simply to die for. Most PDAs, such as Palm's Tungsten and Toshiba's e740, use side- or front-lit screens. These screens are a vast improvement over backlight-only screens (which become washed out in daylight), but their uneven lighting was always a complaint. Enter transflective screens, which combine the best of both worlds. The h1910's 3.8-inch display puts both the Toshiba and the Tungsten T screens to shame. Supporting 16-bit color and a 240x320 resolution, the HP h1910 is simply dazzling next to other PDAs.

Not all is perfect, though. To keep costs down, HP cut out support for SDIO devices like Wi-Fi and Bluetooth adapters, and the PDA's SD slot supports storage duties only. And while you get 64MB of RAM, just 46MB are available for storage.

There are also some other oddities, such as a reversed "universal" connector which doesn't support serial devices. Expansion capabilities certainly aren't the strong suit of the h1910, but then again, HP doesn't think peripheral freaks will be interested in the h1910. The handheld is designed for people who want basic PDA functionality and the ability to run an occasional MP3 file or *Acrobat* file.

The battery—plain Lithium-Ion instead of Lithium Polymer—is rated for 900mAh. It's also user-replaceable, should it take a dump in a couple years. HP says the battery can run up to 14 hours depending on how you use it. We played MP3s for an incredible six hours before the h1910 gave up. That's downright amazing when you consider how tiny the thing is.

We would have liked a full SDIO slot and more RAM, and maybe even some wireless capability. But with its small formfactor, the h1910 is pretty hard not to love.

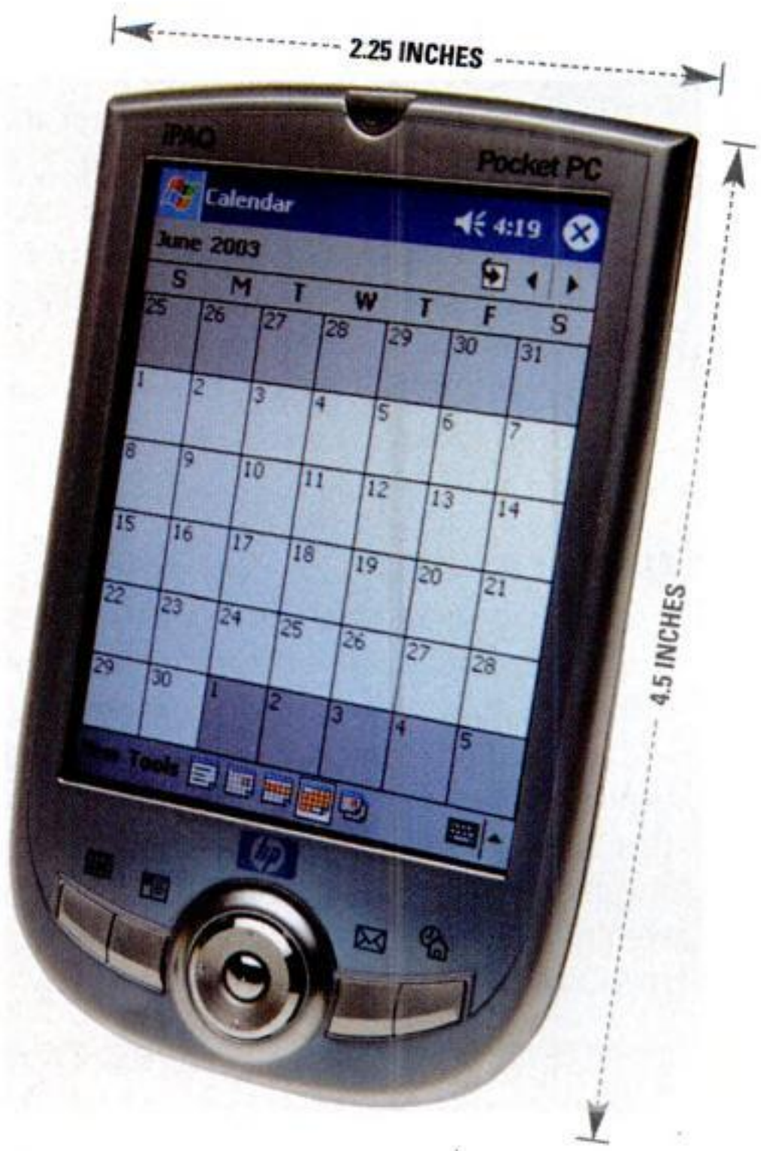
⊕ **PEE-WEE GOLF:** Tiny, yet fully Pocket PC functional. Has one of the best screens we've seen on a PDA.

⊖ **PEE-WEE HERMAN:** Doesn't support SDIO devices, and doesn't come with a carrying case or cradle.

—GORDON MAH UNG

MAXIMUM PC VERDICT: 9

$300, www.hp.com

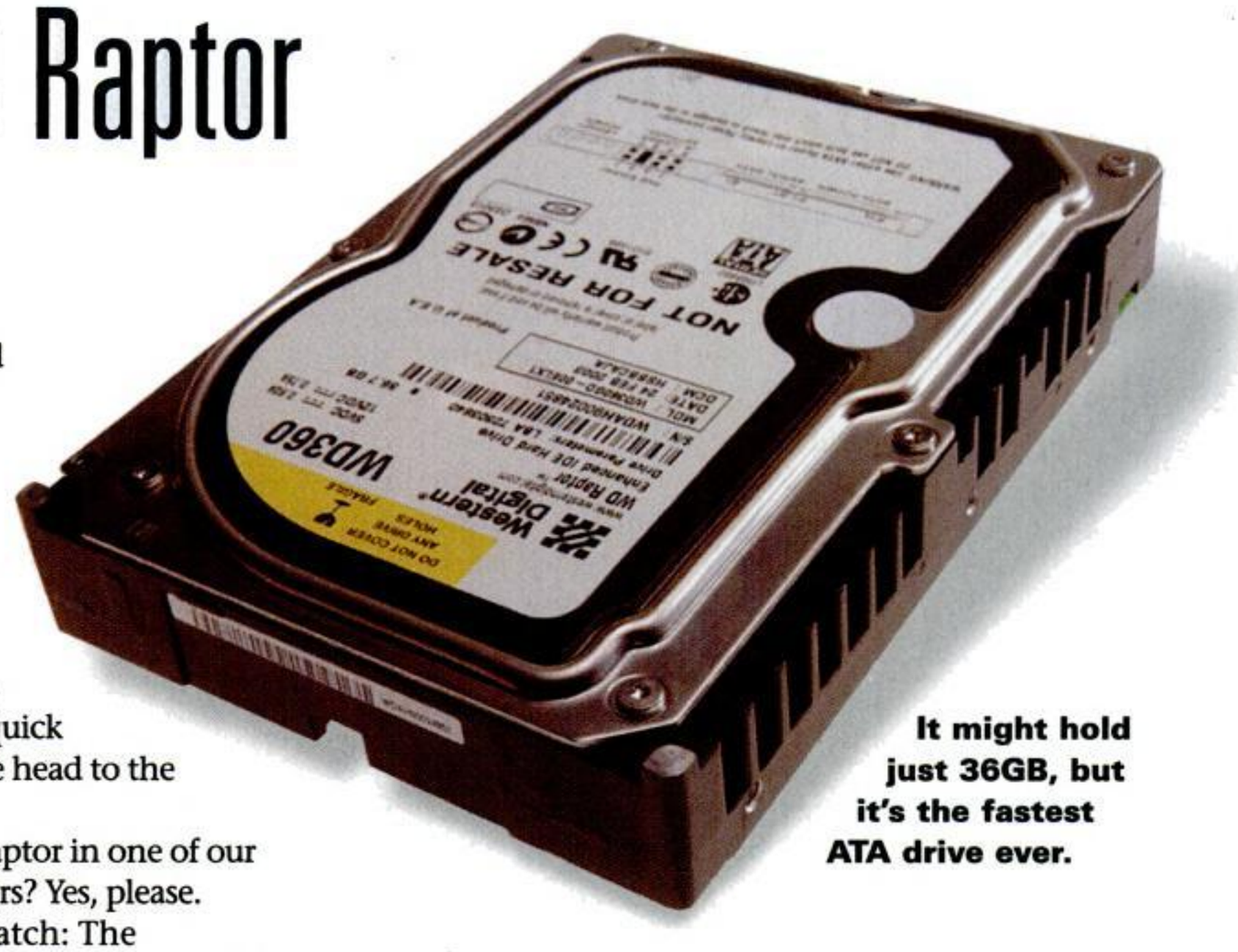


The h1910's transflective screen henceforth raises the bar for PDA displays. Put simply: It's stunning.

Copyrighted material

Western Digital 360GD Raptor

The 10K barrier is now officially broken



It might hold just 36GB, but it's the fastest ATA drive ever.

Until this month, the most elite ATA hard drives were defined by 8MB of cache and 7200rpm spindle speeds. But now there's a brand-new performance feature designed to excite enthusiast desires: 10,000rpm spindle speeds, brought to you by the folks at Western Digital.

MAXIMUM PC KICK ASS PRODUCT

The new 360GD Raptor is the first ATA drive to offer a five-digit rotational speed (SCSI drives have offered 15,000rpm for quite a few years), and it's going to change the face of the hard drive landscape forever. Faster platters can provide an instant shot in the arm for any hard drive. Random access times go down, while transfer rates go up—all because each sector on a platter's surface passes under its drive head many more times per second. The Raptor is a Serial ATA drive (Western Digital's first), and it's intended for light server duty (despite the fact that Serial ATA will become the new desktop standard). But the real story here is the drive's mastery of data handling and throughput.

HDTach's sequential read test (which calculates the average data reading rate across a whole platter) coughed up a score of 55.1MB/s. Writing across an entire platter was equally impressive at 33.5MB/s. That's about 20 percent faster than yesterday's champ, the IBM Deskstar 180GXP! Would we like to use Raptors for desktop video editing? Yes, please.

In our custom-configured *IOMeter* desktop test, we thrash hard drives with so many random input/output operations, they usually puke and beg for mercy. The Raptor, however, finished with a score that was roughly 30 percent faster than the former record-holder. Of course, for a drive like the Raptor, our desktop I/O test is like a walk in the park—baby stuff. It's in our *IOMeter* web server test that the drive shows its best side. Dig the numbers: In the desktop I/O test, the IBM 180GXP hit 150 total I/Os, but dropped down to 143 total in the much more punishing server test. Meanwhile, Western Digital's Raptor nailed 190 total I/Os in the desktop test, then gained another nine during the server run! For this, we might want to thank the Raptor's 8.1ms random access time, which enables quick relocation of the drive head to the right data.

Would we like a Raptor in one of our modest little file servers? Yes, please.

There's just one catch: The Raptor's caching algorithm was never designed to tackle desktop work, so desktop drives like the 180GXP have a chance to "cache" up in many pedestrian desktop applications. *SYSmark2002* testing proves this point, as both the 180GXP and Raptor had identical scores of 166 in the more disk-intensive Office portion of this benchmark. The results left us concerned because the Raptor is fast. We even considered the possibility that our aging test bed was holding the Raptor back. Regardless, *SYSmark2002* does tell us something about how a faster hard drive affects real-world performance: Pedestrian desktop activities just don't hit your disk that often. That said, if you do more disk-intensive work than what's scripted in *SYSmark2002*, you will definitely see a speed jump. Video-editing, file-serving, and even game loading speeds should improve.

There are some other caveats when putting this server drive in your desktop rig. First, its capacity is limited to 36GB. Server storage usually consists of several drives conjoined in RAID, so smaller drives are preferred. Still, we don't mind the puny capacity. Thirty-six gigs seems perfect for a primary partition in a two-drive PC (you would just want a much larger secondary data drive). Second, the drive costs as much as a 160GB 7200rpm drive, pushing the MB-to-dollar ratio darn high. Not SCSI high, but still pricier than desktop IDE drives. The Raptor sports a five-year warranty, but we'd rather have a larger 10,000rpm drive with desktop optimizations, and a shorter warranty.

Go for the Raptor if the capacity doesn't bug you, you need breakneck speed, or have a reason to upgrade to SATA. This is the swiftest non-SCSI drive around. We just can't wait until WD comes up with a desktop-oriented version.

—BRIAN LAM

DARE TO COMPARE: HIGH-END HARD DRIVES

	WD360GD	IBM180GXP
SYSmark2002 Office	166	166
HDTach Average Sequential Read	**55.1 MB/s**	45.5 MB/s
HDTach Average Sequential Write	**33.5 MB/s**	27.7 MB/s
HDTach Random Access Time	**8.1ms**	13ms
IOMeter Desktop total I/Os per second	**190**	150
IOMeter Desktop average I/O response time	**337ms**	424ms
IOMeter Web Server total I/Os per second	**199**	143
IOMeter Web Server average I/O response time	5109ms	**6181ms**

Best scores are bold. For HDTach Random Access Time and IOMeter Average I/O Response Time, lower numbers are better. For all others benchmarks, the higher are better. All drives were tested in our zero-point system: a 2Ghz Pentium 4 with an Intel 850MV mobo and 512MB of PC800 RDRAM. The 180GXP interfaced with the onboard ATA100 controller, and the Raptor interfaced with a Silicon Image 3112A SATA card.

MAXIMUM PC VERDICT

360GD Raptor
WESTERN DIGITAL

+ BIRDS OF PREY
Fastest non-SCSI drive ever—with the benchmarks to prove it.

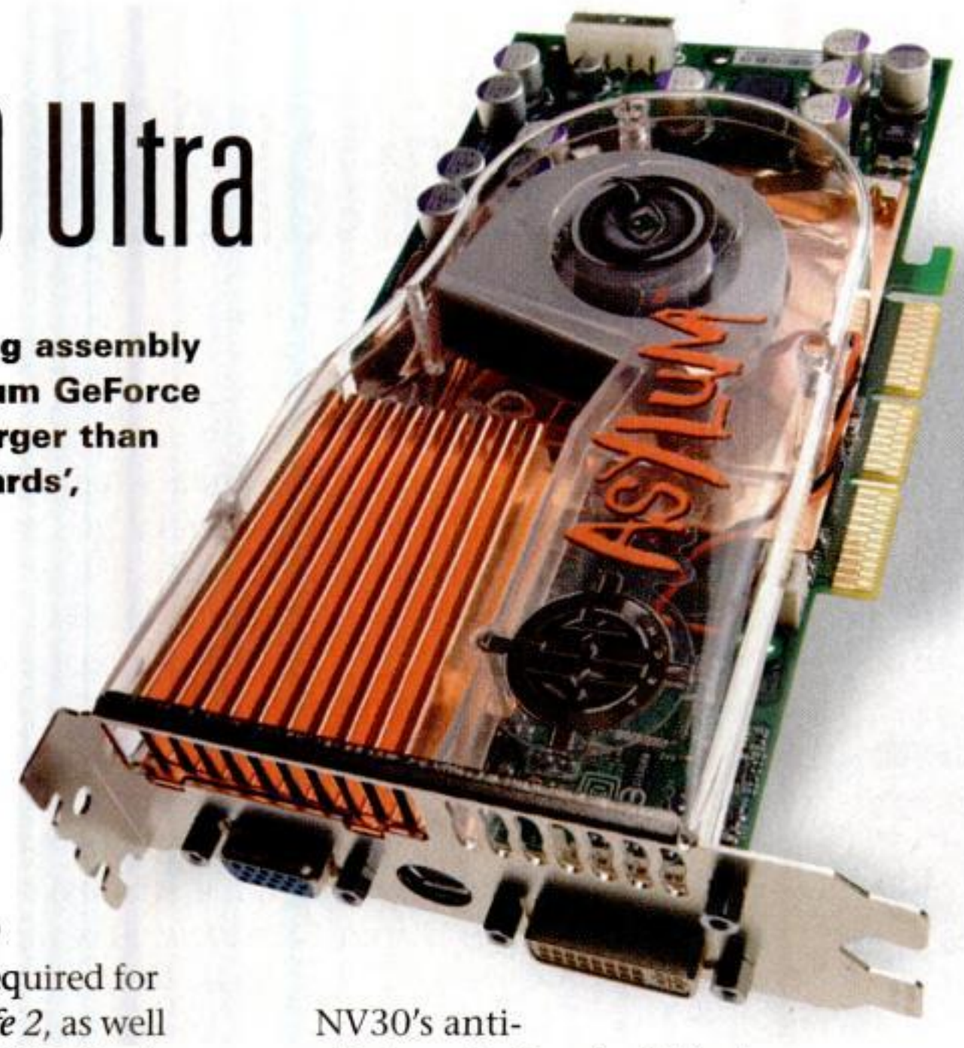
– STINKIN' PIGEONS
Expensive for a 36GB drive. Not tuned for the desktop.

www.wdc.com
$160
9

Copyrighted material

BFG Asylum GeForce FX 5800 Ultra

Not nVidia's finest moment



The FX Flow cooling assembly affixed to the Asylum GeForce FX 5800 Ultra is larger than many competing cards', and twice as loud!

Hundreds of thousands of words have been written about the GeForce FX 5800 Ultra—the videocard technology based on nVidia's NV30 core. Amid all the coverage, a number of specific words have kept cropping up: *loud, massive, ridiculous, Dustbuster,* and *leaf blower.* So let's get this out of the way early: The Asylum GeForce FX 5800 Ultra takes up two slots. The second slot is for a large, unwieldy cooling apparatus. When you turn on a game, the fan spins up. When the card's core cools off, the fan spins down. The fan is noticeably loud. You definitely hear it when it spins up, and you can't miss it spooling down.

The GeForce FX 5800 Ultra is nVidia's first 0.13-micron part. Its smaller die size—and ridiculously massive cooling solution—lets nVidia crank the core to 500MHz, a speed that is well beyond what ATI's 0.15-micron core is capable of. The Asylum sports 128MB of 128-bit DDR-II SDRAM. This gives the card a maximum theoretical memory bandwidth of about 16GB/s.

Like the ATI 9800 Pro, the FX also supports all the DirectX 9 features that will be required for *DOOM III* and *Half-Life 2,* as well as full floating-point 128-bit color. There's been some concern that the drivers we used for last month's reference board (version 42.63) use lower quality settings in order to improve benchmark performance. However, with the updated drivers that we used for the review on this page (version 42.69), we couldn't see any artifacting that would indicate visual quality finagling.

The card's performance was good, but not spectacular. Compared with cards based on the last nVidia chipset, the Ti 4600, the BFG Asylum scored significantly better in almost all of our benchmarks. Nonetheless, the latest nVidia effort is only a bit faster than the ATI Radeon 9700 Pro in some tests, and is spanked by the Radeon 9800 Pro pretty much across the board. It just doesn't reach ATI's latest bar.

That said, the BFG Asylum is certainly capable of running all of today's games at high resolutions and competitive frame rates. Alternately, if you want to run games like *Quake III* and *Unreal Tournament 2003* with all their eye candy goodies enabled, you can do so and still maintain frame rates above 60fps. You'll just have to choose slightly lower resolutions (like 1024x768 on a 3GHz P4).

The Asylum includes both DVI and a DB-15 outputs, as well as an S-Video output. Unfortunately, there isn't yet an add-on to let you connect your nVidia card to an HDTV yet. We're also a little disappointed by the quality of the NV30's anti-aliasing. As the straight edges that are prone to aliasing begin to approach horizontal, the amount of AA being done to them seems to taper off considerably.

But the real problem with this card isn't performance or image quality. It's availability. Pre-order options have been removed from participating web retailers, and no computer stores in the San Francisco Bay Area had received shipments by the time we were going to press. Our BFGTech rep said all the pre-orders had shipped, but did not give an ETA for retail boards.

The BFGTech card is representative of all the GeForce FX 5800 Ultra boards that will be on store shelves when you read this. The sad news is that this card is neither as fast, nor as well-mannered as the Radeon 9800 Pro. If only the fastest will do, the GeForce FX 5800 Ultra isn't right for you.

—WILL SMITH

THE SPECS

Core type	nVidia NV30
Core clock	500MHz
Core process	0.13-micron
Memory type	128-bit DDR II
Memory size	128MB
Memory speed	500MHz

BENCHMARKS

	NO AA /NO ANISO	4X AA /8X ANISO
3DMark2003 Default	4419	2098
3DMark2003 Game 2	28.9	10.9
3DMark2003 Game 4	33.4	16.5
Quake3 MPC Demo	138.2	51.5
Serious Sam – Valley Demo	28.9	21.7
UT2003 Flyby	113.0	33.9
UT2003 Botmatch	64.8	23.0

All benchmarks are run in a Pentium 4 3.06GHz machine with 512MB of RAM. All benchmarks are run at 1600x1200 in 32-bit color, except for the three 3DMark benchmarks, which are run at their default resolution, 1024x768. Benchmarks were run using the 42.69 driver.

TESTING IMAGE QUALITY

There's been much recent controversy regarding the testing of the anisotropic filtering used by ATI and nVidia—each company offers 8x aniso with trilinear filtering enabled, but with different implementations. Let it be known, for all of our high-quality benchmark settings, we turn on 4x AA, 8x anisotropic filtering, and trilinear filtering. To enable these settings with the GeForce FX chipset, we set the AA and aniso settings in the Image Quality tab of the nVidia control panel, then set the Performance slider to Balanced. We'll discuss the visual quality controversy further in next month's "Videocard Answers" cover story.

MAXIMUMPC VERDICT

BFG Asylum GeForce FX 5800 Ultra
BFGTECH

+ DODGE VIPER
It's pretty fast, and it didn't make our PC explode.

– DMC DELOREAN
It's not as fast as the Radeon 9800 Pro, it's loud, and it takes up both your AGP slot and the adjacent PCI slot.

www.abspc.com
$400
7

Copyrighted material

ATI Radeon 9800 Pro 128MB

The latest Radeon "effects" a decisive victory

MAXIMUM PC KICK ASS PRODUCT

Last month, we tested a final production Radeon 9800 Pro with drivers that weren't quite ready for prime time. This month, we review the final shipping retail board and drivers—and the results are remarkably similar to the reference package. The 9800 Pro's R350 core runs at 378MHz on a 0.15-micron process, and its 128MB of 256-bit DDR SDRAM runs at 338MHz (a 256MB version of the card is coming). Like the Radeon 9700—which was based on the R300 core—the 9800 Pro is a fully compliant DirectX 9 3D accelerator.

The Radeon 9800's 8-pixel pipelines and 21.6GB/s of raw memory bandwidth don't just help the card excel at today's 3D applications. No, the 9800's programmable shaders are fully compliant with both of the DirectX 9 programmable shader specs, and this ensures future game compatibility. That's right, you'll be able to play all the fancy next-gen games—such as *DOOM III* and *Half-Life 2*—with all their hoity-toity shader effects enabled. Prepare yourself for bump-mapped everything, gratuitous use of reflective surfaces, and volumetric shadows for every single model. You'll also have complete support for full 128-bit floating point color, which helps minimize artifacts caused by rounding errors and the imprecision that results when blending integer-based colors.

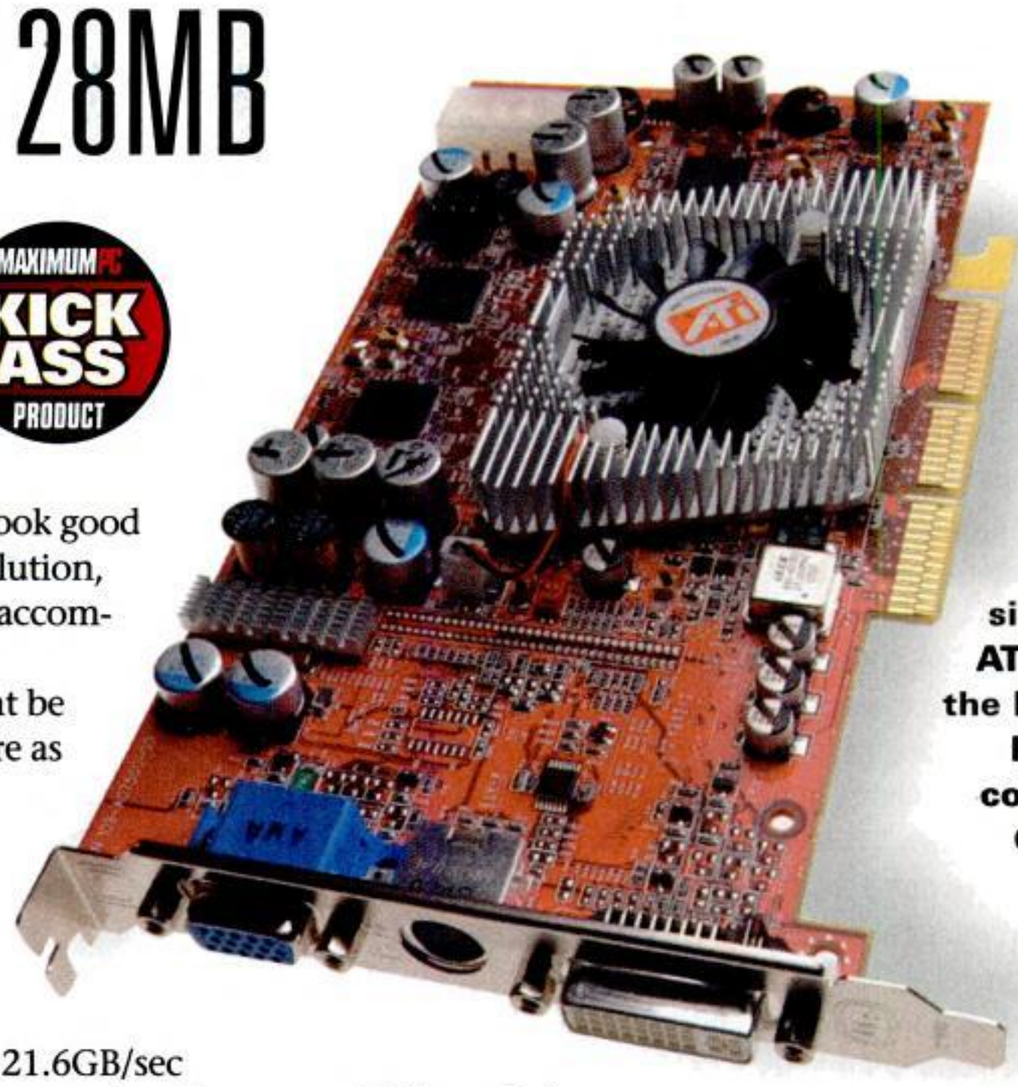
Like all well-behaved 3D accelerators, the 9800 Pro sports both a DB-15 analog VGA jack and a DVI interface suitable for flat-panels. The 9800 Pro also includes a couple of TV-output options—a standard S-Video out, and a component output option suitable for use with HDTVs.

Hands down, the nicest thing about the 9800 Pro is that you can run most of today's games with all their detail settings cranked to the max. This means anti-aliasing, anisotropic filtering, and texture quality fully enabled even at high resolutions, such as 1280x1024. The hardest of the hardcore may live and die by the frame rate, but we like our games to look good and run at a high resolution, and a 9800 Pro board accomplishes that.

The 9800 Pro might be based on the same core as the 9700 Pro, but ATI added two key enhancements. First, the memory controller has been optimized to better take advantage of the 21.6GB/sec of raw memory bandwidth. Second, in order to facilitate massive shader programs, the 9800 Pro includes a FIFO buffer. This "F-buffer" will let developers write very long programs and run them without any special modifications. In fact, using the F-buffer, developers and CGI artists can run extremely complex shader programs—like Pixar lighting programs—that previously required large render farms hours to draw. All in near-real-time, on their own PCs. This is the first step toward giving 3D game developers the exact same tools that were used to create modern animated movies like *Shrek*.

As for pure, raw performance across a wide range of resolutions and visual quality settings, the 9800 Pro is faster than the GeForce FX in most benchmarks, but not by a huge margin. The real differences between the 9800 Pro and FX are their respective sizes (the FX and its cooling apparatus take up two slots) and noise output (the Radeon uses a standard cooler that's much quieter than the FX's). Right now, the Radeon 9800 Pro is the fastest and most highly finessed 3D accelerator you can buy.

—WILL SMITH



The delicate silver heatsink ATI is using for the Radeon 9800 Pro is a stark contrast to the GeForce FX's two-slot behemoth.

THE SPECS

Core type	ATI R350
Core clock	378MHz
Core process	0.15-micron
Memory type	256-bit DDR
Memory size	128MB
Memory speed	338MHz

TESTING IMAGE QUALITY

There's been much recent controversy regarding the testing of the anisotropic filtering used by ATI and nVidia—each company offers 8x aniso with trilinear filtering enabled, but with different implementations. Let it be known, for all our high-quality benchmark settings, we turn on 4x AA, 8x anisotropic filtering, and trilinear filtering. To enable this with the Radeon 9800, we select the Quality setting in the control panel. We'll discuss the visual quality controversy further in next month's "Videocard Answers" cover story.

BENCHMARKS

	NO AA /NO ANISO	4X AA /8X
3DMark2003 Default	5532	2655
3DMark2003 Game 2	36.1	13.0
3DMark2003 Game 4	32.6	22.1
Quake3 MPC Demo	147.5	82.1
Serious Sam – Valley Demo	40.2	34.1
UT2003 Flyby	135.3	75.9
UT2003 Botmatch	71.4	47.0

All benchmarks are run in a Pentium 4 3.06GHz machine with 512MB of RAM. All benchmarks are run at 1600x1200 in 32-bit color, except for the three *3DMark* benchmarks, which are run at their default resolution, 1024x768. Benchmarks were run using the Catalyst 3.1 driver.

MAXIMUM PC VERDICT

Radeon 9800 Pro
ATI

+ DR. PEPPER

It's the fastest card money can buy, it doesn't overlap into any neighboring slots, and it's quiet.

– PRUNE JUICE

No TV and remote-control features of the All-in-Wonder 9700, and it could use another 128MB of memory—sooner rather than later.

www.ati.com
$400

9

Copyrighted material

Antec LANBOY

The case of choice for LAN party marauders

Close your eyes, take ahold of the included carry strap, and you'll think the feather-light LANBOY is your grade school lunchbox.

Imagine a post-apocalyptic nightmare. All cities have been destroyed, broadband no longer exists, and only geeks hardened by years of exposure to CRT radiation have survived the nuclear fallout. Tribes of nomadic nerds are all that's left of the former superpowers, and all conflict is settled by keyboard-to-keyboard multiplayer warfare. In this harsh environment, PCs need to do double duty as main desktop rigs and portable LAN party boxes. Enter the LANBOY, which offers a cunning mix of practicality and aggression.

Four 5.25-inch railed drive bays and two 3.5-inch external bays hide behind a plastic, faux-silver door. The case also features two internal 3.5-inch bays, but we see them getting toasty because the 3.5-inch cage doesn't support a fan. The rest of the cooling configuration is minimal. There's room for a single 80mm fan in front, and another in the rear exhaust position. For pimp and swagger, the LANBOY includes a 350-watt SmartBlue LED power supply, which casts a nice glow off of your components when viewed through the included case window. Two front-mounted USB ports put to rest any notion that the LANBOY is a barren package.

The LANBOY might be polished and feature-laden, but it's no hog. Standing at 17 inches high, the full-featured case doesn't take up much room. And for those frag-fest showdowns, the LANBOY's light aluminum construction allows for swift deployment, especially when you use the included case carrier.

Unfortunately, the LANBOY's weight-saving design sacrifices the sturdiness of a hefty steel case. The mobo tray isn't removable, but we loved the included screw compartment—super-handy when swapping hardware in the field. We also dig the locking tray cover, which keeps unauthorized swapping from occurring at all. (Post-apocalyptic padlock not included.)

—BRIAN LAM

MAD MAX: Not too big, not too small, full of trick features.
WHATEVER THE THIRD MOVIE WAS CALLED: Not the sturdiest case we've ever sat on.

MAXIMUM PC VERDICT: 9

$100 (350-watt SmartBlue PSU included), www.antec-inc.com

Wahoo Chilli Pro

The devil's case, with an angelic face

You'll be as blue as the Chilli when you find out what a nightmare it is to work with.

The Wahoo Chilli Pro is a tempting case. The top and side panels—made from sultry pieces of quarter-inch thick, blue-anodized aluminum—look as if they were crafted by the hands of an angel. The PSU is mounted in the bottom of the case (where temperatures are cooler), and the motherboard follows suit with an upside-down orientation, so your CPU is located at the bottom of the case as well. The mini-ATX enclosure itself is small, solid, and fairly innocuous.

It all sounds dandy, but once you pull back the Chilli's beautiful shell, you'll expose more than one level of case-design hell.

The first level of hell is reserved for torturing people who need frequent interior access: To install or remove a drive, no fewer than 16 screws (eight on each side) need to be removed. And if that weren't enough, the screws are hex screws. Even the hardiest, most resilient case-modders will probably stab themselves with a hex wrench after dealing with just a few of the infernal fasteners.

The next level of hell takes care of anyone who's accustomed to using sturdy drive cages with smooth edges. Unlike the inviting aluminum castings on the outer portion of the Chilli case, the flimsy drive bays within promise more digit slicing than a poorly supervised wood shop. While working on the two 5.25-inch bays and four 3.5-inch bays, you might be better off wearing gloves.

The final level of hell is the most heinous. The first five aluminum panels of the Chilli inspire hope, but the cheap plastic bottom panel (the *sixth* panel) is a piece of junk. It flexes and guffaws under the slightest pressure, causing us to doubt the case's overall integrity. Furthermore, the placement of the CPU near the bottom panel's cooling vent seems like a blessing—until you realize that the power supply sits too close to the CPU, and prohibits the mounting of an extra large heatsink to squelch your processor's heat.

This almost-overwhelmingly attractive case might seduce fanatics who want to show off at LAN parties. But if you plan on living in your box, working on it every day, you should heed our warning: All hope abandon, ye who mounts computer hardware in the Chilli Pro.

—BRIAN LAM

HOT CHILI PEPPERS: Amazing aluminum craft work.
CHILI CHEESE DOG: 16 hex screws required to access drive bay, too many sharp edges, and a flimsy bottom.

MAXIMUM PC VERDICT: 5

$190 (no power supply), www.wahoocomputers.com

Copyrighted material

MSI 52/24/52 CD Burner

Mobo manufacturer says: Let 'er rip!

MAXIMUM PC KICK ASS PRODUCT

There was once a time when we didn't think CD burning would increase beyond 48x. But then again, there was also a time when we never imagined that a TV show featuring people eating animal testicles would be a hit. We're still not crazy about testicle consumption, but we're pleased that MSI, having thrown its hat into the optical arena, managed to shave off time from our current CD burning records. The MSI 52x also whipped out digitized tracks from audio CDs in just slightly more than two minutes—2:05 to rip more than 70 minutes of music without any flaws, to be exact.

We're duly impressed. And although it's splitting hairs, the MSI 52x burned a 700MB disc in 2:35, exactly one second faster than the TDK 52x. Future firmware revisions might be able to lower MSI's time even further, as the last 25 seconds of our 2:35 burn was devoted to writing the lead-out (as reported by *Nero*), which is fairly long for this finishing process. MSI's CD-RW writes tied with Plextor's fastest PlexWriter at 3:47.

BENCHMARKS	
Average data transfer (MB/sec)	5.8
Average drive rating	31.7x
Random/full-stroke seek (ms)	90/154
Audio extraction (min:sec)	2:05
Data CD burn (min:sec)	2:35
CPU utilization (at 8x)	5%

The audio extraction test uses a commercially stamped 70:07 minute audio CD. The data-CD burn test uses the bundled applications to create a 700MB CD-R. All tests were performed using Verbatim media, except where indicated.

Physically, the MSI drive is about a quarter-inch shorter than both the 48x PlexWriter and the 52x Lite-On. This might not sound like much unless you're trying to cram an optical drive into a petite Shuttle case. And the Play/Skip button on the front of the drive is a nostalgic touch. Using the skip button caused an audible blip between tracks, but we won't make a big deal over a button that few people will ever use.

Our Art Director, Natalie Jeday, can hold her breath longer than it takes the MSI 52x burner to rip a 70-minute plus CD. We really do live in a world of miracles.

The MSI 52x is not the quietest drive we've ever tested, nor is it the loudest. Going at full-bore read speed, the drive emitted a fairly prominent low-frequency sound. But while playing an audio CD (which spins at 1x), we couldn't hear the drive at all.

We still prefer the dramatically lower seek times of the PlexWriter 48x (60ms for a random seek, as opposed to the still-impressive 90ms of the MSI 52x). That said, it is nice to shave a few seconds on each full-disc burn. Thus, the record-busting MSI 52x is our new budget favorite.

RIPPING: MSI hits the ground running with a furiously fast drive that breaks the record in digital audio extraction.

SKIPPING: Plextor is still the leader in access times. The drive has a very audible buzz at high speeds, and doesn't bundle an IDE cable.

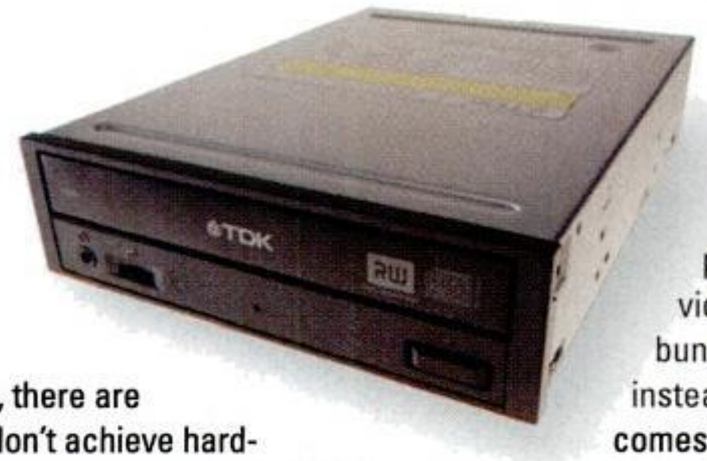
—LOGAN DECKER

MAXIMUM PC VERDICT: 9

$55, www.msicomputer.com

TDK's indiDVD DVD Burner

The B-movie burner



Let's get one thing straight: We may be hardware enthusiasts, but we're not snobs. Just like there are some movies we enjoy even though they're less than transcendent experiences, there are products that capture our fancy even though they don't achieve hardware nirvana. Take for example TDK's first recordable DVD drive, the indiDVD.

Shortcomings that might vex consumers in another product aren't likely to hurt the indiDVD's popularity. Not with the excellent, jargon-free documentation covering both the hardware and the software. Not with a Flash presentation covering every aspect of installation, from opening your case to setting the jumpers. And even the fuzzy monster on the box somehow manages to convey the idea that the whole idea of buying a personal DVD burner is about having *fun*.

The indiDVD burns to DVD+R at 4x—the fastest rate available—and it set a new record filling up a whole DVD in just less than 14 minutes. But overall, its performance—from seek times to CPU utilization—was just slightly above average. Audio extraction proved to be the most difficult chore for the indiDVD. Its digital audio extraction peaked at just under 30x, for a best time of 4:19. That's not awful, but it had a difficult time ripping at the extremities of long-length CDs, slowing down to single-digit speed, and sometimes skipping the last track altogether.

BENCHMARKS	DVD	CD
Average data transfer (MB/sec)	9.3	4.5
Random/full-stroke seek (ms)	118/197	112/173
Audio extraction (min:sec)	-	4:19
Data burn (min:sec)	13.58	5:29
CPU utilization	21% (2x)	6% (8x)

The data CD burn test uses the bundled applications to create a 647MB CD-R. The data DVD burn test uses the bundled applications to create a 4.25GB. The audio extraction test uses a commercially stamped 70:07 minute audio CD. All tests were performed using Verbatim media, except where noted.

Writes to:	
DVD-R	4x
CD-R	16x
Rewrites to:	
DVD+RW	2.4x
CD-RW	10x
Reads:	
DVD-ROM	12x
CD-ROM	40x

As the name suggests, TDK is pushing its burner toward the digital video crowd. To that end, the burner is bundled with Pinnacle's *Studio SE 8.5* instead of Sonic's *MyDVD 4.0*, which comes with nearly every other recordable DVD drive. While *Studio SE 8.5* has a vastly more capable video-editing engine than *MyDVD 4.0*, it lacks the ease of use of the latter, and can't come close to *MyDVD* for making spectacular multimedia backgrounds. Even worse, you don't find out that some features aren't included in this "SE" version until you click on them and are met with an advertisement to upgrade to the full edition. Weak.

No casual user would be disappointed in this drive, especially those people who are just dipping their toes into digital video and don't already own an editing app. But indiDVD lacks the swift reading transfer rate of Pioneer's A05, and doesn't offer the dual-format capability of Sony's DRU-500A. (Sony's latest iteration, the DRU-500AX, also burns at 4x to DVD+R.) And we miss Sonic's ace *MyDVD 4.0*. But then again, those other products don't have fuzzy monsters on their boxes.

BABIES: If you read the documentation and still have a hard time operating the drive, then, yes, it's you. It beat Pioneer's DVR-A05 by more than 45 seconds burning a full DVD.

RABIES: In order to climb to the top, the indiDVD needs lower CPU utilization, faster CD burning, and much better audio extraction. And dual-format support wouldn't hurt, either.

—LOGAN DECKER

MAXIMUM PC VERDICT: 8

$300, www.tdk.com

Copyrighted material

Instant Copy

Arhhh. This be no utility for software pirates, matey

Do'h! But the box said it would copy a DVD!

The sexy box copy is sure to sell a lot of software: "Copy a 9GB DVD onto one 4.7GB DVD… Make perfect copies of your CDs and DVDs." Sounds sweet, right? But when you read the *Instant Copy* packaging a bit more closely, you'll find an advisory that'll stop you dead in your tracks: "Except copy-protected DVDs/CDs."

Now, that's a fine hidey-hoe.

Why would anyone even want this app? For all the non-copyrighted DVD content that Pinnacle thinks you're dying to copy? Hah!

We suspect Pinnacle is playing the old "switchblade kit" trick. You know the deal: You can't legally buy a switchblade 'round these parts, but you might be able to get your hands on a switchblade kit—thus the law gets broken only when you put all the parts together. In the case of Pinnacle's *Instant Copy*, you can in fact make duplicates of copy-protected discs. You'll just need help from an illegal third-party app such as *DVD Decrypter*. Using that program, you can strip the copy-protection from a DVD, which would put you in breach of the law.

With either a ripped movie or a non-protected DVD, *Instant Copy* is pretty handy. You can use it to transcode a dual-layer disc onto a single disc (DVD-R, -RW, +R, +RW, or RAM), or burn it to Super VCD or VCD. The transcoding that Pinnacle uses is good but not great. It produces an image quality that's far better than that of VCD, and definitely better than Super VCD. The transcoding quality can also improve depending on how many features you want to delete from a DVD movie disc, and *Instant Copy* makes it easy to strip out options you won't use (such as subtitles and audio tracks). The app is a serious CPU hog. On both a 2.8GHz P4 machine and a dual-CPU Athlon MP box, the transcoding process took hours, making us think the word "instant" should've been left out of the product name.

If you're looking for one-shot DVD copying, it makes more sense to invest in *DVDXCopy*, which does exactly as it promises: It copies many DVD movies (albeit to two discs). *Instant Copy*, meanwhile, is only half of what you'll need to burn movies.

That said, if you're happy with *Instant Copy's* limited feature set, then it's actually a good deal for the low price of $49. Anyone serious about backing up a DVD collection should probably include both *Instant Copy* and *DVDXCopy* in his or her arsenal. DVD-duping software clearly faces some legal and technical hurdles, but at least it's evolving.

Oddly, while *Instant Copy* will refuse to copy a DVD movie, it copied a copyrighted audio disc without a hiccup. The interface is professional and straightforward, which is always a plus.

—GORDON MAH UNG

ANYTHING: Copies up to 9GB onto a single 4.7GB DVD; good image quality; and professional interface.

GRAPE NUTS: Cannot in and of itself duplicate copy-protected material, and to call the product *Instant*-anything is a bit misleading.

MAXIMUM PC VERDICT: 8

$49, www.pinnaclesys.com

Chemicus

Or should we say, *CheMyst*

Rather than encouraging dangerous lab habits like sniffing or tasting, *Chemicus* provides you with a handy loupe-like device that identifies the chemical composition of the objects you come in contact with.

Guess what happened to Richard the other day? The big doofus discovered how to enter a parallel world wherein the culture is entirely based on the principles of chemistry. Sadly, its inhabitants quickly accused him of stealing a crucial "transmission molecule" and disturbing the balance between our two worlds. They're steaming mad and *this close* to beating the crap out of him to get it back, so you have to follow Richard into *Chemicus*, find (or reproduce) the missing molecule, and defuse a tense situation.

Just like *Myst*, *Chemicus* is a first-person slideshow adventure game primarily made up of a series of achingly beautiful but largely static environments. The unique aspect of *Chemicus* is that the puzzles, for the most part, rely on actual chemical principles. We're not talking about making rock candy or using litmus strips here, folks. You start out simple with electrolysis, and eventually graduate to electroplating, redox reactions, all the way to mass spectroscopy. If you're stumped, or if you don't know what raw materials you'll need to forge, say, your own steel gear shaft, you can consult the in-game knowledge base by pressing a button at the bottom of the screen. There you'll find seven chapters covering what in a textbook would be called "The Amazing World of Chemistry." In the hyperlinked text of this primer, you'll find every chemical principle, diagram, and instruction necessary to complete the game. But if you'd rather have your arms torn off than learn something, you can always refer to the walk-through included on the CD.

Unfortunately, *Chemicus* suffers from several Deadly Gaming Sins. The resolution is 640x480, and much of that pitifully small real estate is taken up by the interface. Objects don't highlight where they can be used, so you'll end up waving a handful of quicklime around trying to find a "hotspot" in vain. And despite a full install, the in-game cinematics and some animations still stream from the CD. Still, most people are more likely to be put off by the unmistakable whiff of edutainment, a classification that ranks just below syphilis in terms of desirability. But *Chemicus* is in fact more game than it is education; you could easily complete it stumbling around like a drunk using just trial and error. But it's pointless to play the game without some innate curiosity about chemistry—it becomes just a dull, albeit good-looking, *Myst* clone. That's what makes *Chemicus* such a unique experience that might easily fly underneath a gamer's radar—the greater your curiosity about chemistry, the more fun you'll have.

—LOGAN DECKER

THE CHEMICAL BROTHERS: We had no idea that we could have so much fun without guns!

THE SMOTHERS BROTHERS: 640x480? Was the game intended to be played on a handheld?

MAXIMUM PC VERDICT: 7

$20, www.tivola.com

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Unreal II

Another ho-hum bug hunt

Skaarj are back, doing a kind of tumble-tot zig-zagging routine as they run towards you for a rather effective bit of disemboweling.

Spiders! It's full of spiders! There's a rule about spiders in games: They are the designer's way of saying: "I give up. I have run out of ideas."

Strangely, that feeling permeates all of *Unreal II: The Awakening*, a game so eagerly anticipated that even the editors at *Maximum PC* were quivering like hummingbirds as they anxiously awaited a copy. Sadly, now, after having actually played the game, their hummingbird wings have slowed to a dead stop. "We waited for this?" is the question on everyone's lips.

Unreal II has an amazing degree of polish. It's slick, it's gorgeous, and it has one or two breakout moments. But our sustained impression over the course of a meager 12-odd hours of gameplay is one of profound familiarity and undeniable disappointment. *Unreal II* is not, by any stretch of the imagination, a bad game. It is, however, a crushingly unsatisfying one.

So how can a "not bad game" warrant a mere 6 verdict? The problem lies in a burden of expectations, and while Epic/Legend may cry foul, this burden is the inevitable byproduct of five-odd years of unrelenting hype. The first *Unreal* was a watershed title. When gamers emerged into that open space, with the waterfall in the distance and the critters hopping about, they entered a new era in gaming. That the rest of *Unreal* never quite lived up to the first scene's promise—that it resorted to standard run-n-gun clichés—was never that big a problem. It was good, old-school action gaming. It pulled the plow.

Unreal II is sort of like the first game, but without the shock value of the waterfall. We already know how good games can look. But we also expect more from our action games in the wake of many clever, well-scripted titles (quite a few of which were made using the original *Unreal* engine). The really odd thing about *Unreal II* is that its meager narrative was created by a team of people with proven track records. The script is by Bob Bates, president of Legend and standard-bearer for the puzzle adventure game. The co-designers are Glen Dahlgren and Mike Verdu, whose *Wheel of Time* is one of the neglected masterpieces of late-1990s action gaming: It's got more interesting events, people, locations, and content in a single level than you'll find in all of *Unreal II*.

All of this makes *Unreal II* dreadfully difficult to evaluate. Nothing in it immediately reeks. Everything looks good. There are plenty of enemies. The pacing is decent. The levels are mostly good, but none stand out as classics. The weapons are almost pathologically generic: pistol, assault rifle, shotgun, rocket launcher, grenade launcher, flame-thrower, big gun, sniper rifle, and shock lance. Seriously: a shock lance? Please. That's just so... 1993. All of these weapons are perfectly functional and effectively animated, but they bring nothing to the table but old memories. Probably the weakest element of the game is the flaccid monster design, which ranges from seen-it (the skarrj) to what-is-it? Plus, there are those spiders. *Grrrr*.

But perhaps the most catastrophic failing of *Unreal II* is its almost nonexistent shelf life. Not only is it short, but it has no multiplayer component whatsoever, guaranteeing it a quick trip through Add/Remove Programs once the final curtain falls on the main mission. There are no skirmish levels, no nuthin'. Dividing the franchise into *Unreal* and *Unreal Tournament* may have seemed like a good idea at the time, but removing all multiplay from *Unreal II* was a fatal error. A game lives on between versions because of multiplayer. Take that away, and a game is DOA. It also leaves you feeling pretty ripped off, since for $50 you get very little.

For all its beauty and accomplishment, *Unreal II* is ultimately an empty game, coasting on its reputation rather than expanding the genre. It's enjoyable enough, but it will never be mistaken for a great game.

One of the game's better moments is a standoff in which you and three marines protect a landing zone from monsters pouring out of the dark.

—THOMAS L. MCDONALD

MAXIMUMPC VERDICT

Unreal II
INFOGRAMES

+ ORIGINALS

Stunning 3D engine. Solid, familiar run-n-gun action.

– SEQUELS

Short play time. Little in it is fresh or interesting. Levels, weapons, and creatures are average—which is unacceptable for a game of this magnitude.

www.infogrames.com
$50

6

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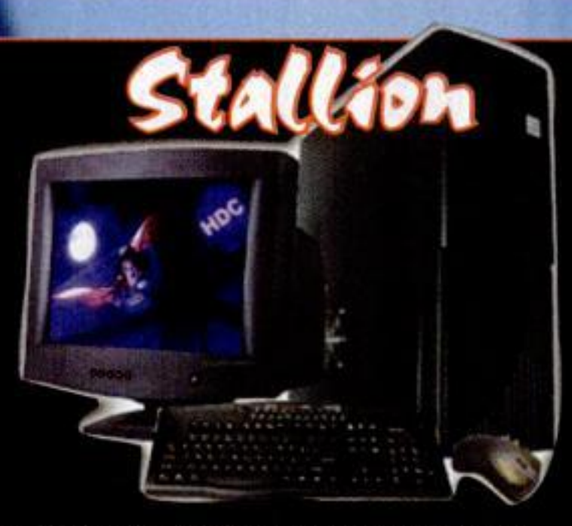

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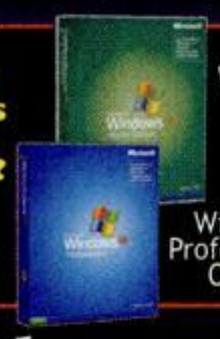

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		USB Removable Drives		
Iomega	100MB	Zip Ext USB Drive	31714	$76
Iomega	250MB	Zip Ext USB Drive	31310	$112
Iomega	750MB	Zip Ext USB Drive	32324	$146

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Klipsch

Klipsch	5.1	6pc	$399
Klipsch	4.2	6pc	$299
GMX D	5.1	5pc	$299
Klipsch	2.1	3pc	$179

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Z540	4.1	40W	$69
Z640	5.1	51W	$73
Z560	4.1	400W	$144
Z680	5.1	480W	$288

Creative Labs

Inspire5200	6pc	47W	$66
Inspire6600	7pc	120W	$103
Megaworks THX550	6pc	500W	$263

Monitors

		CRT Monitors	
Viewsonic	17"	Q71-6 17" 1280x1024 .23mm	$135
Viewsonic	17"	E70B8 17" 1280x1024 .24mm	$138
NEC	17"	FE791SB 1600x1200 .25mm	$194
Viewsonic	19"	Viewsonic GS790-2 1600x1200	$292
Samsung	19"	Samsung 19" 1920x1440 .20mm	$318
NEC	19"	Diamond Pro 930SB 1920x1440	$329
		LCD Monitors	
NEC	15"	LCD1560NXBK Black 1024x768	$338
Samsung	15"	152T Silver 1024x768	$414
Sony	15"	SDM-X52 Gray 1024x768	$403
Viewsonic	15"	VE155B Black 1024x768	$316
Samsung	17"	171SBlack 1280x1024 .26mm	$496
Viewsonic	17"	VE170 Beige 1280x1024	$553
Samsung	21.3"	210T Silver 1600x1200	$1625

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Logitech MX700 RF Cordless Optical Mouse w/Base
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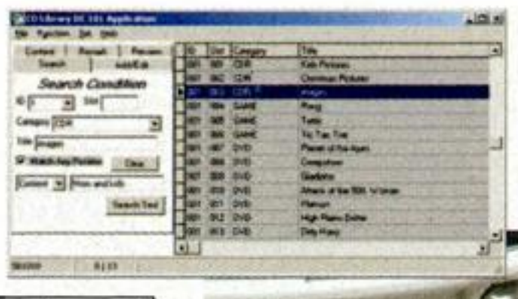

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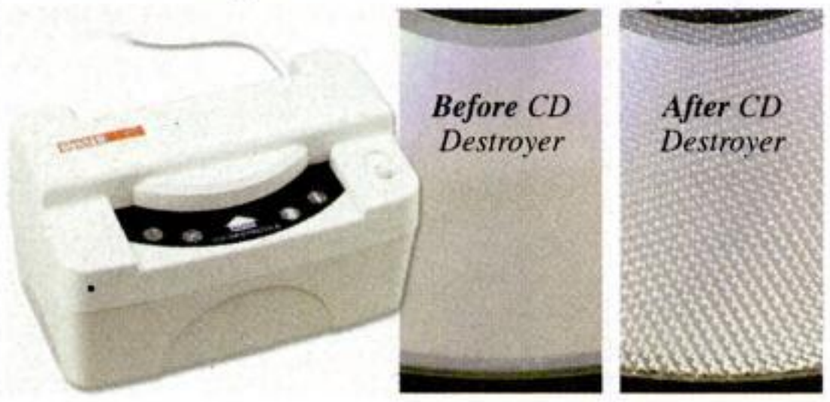

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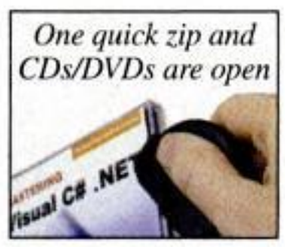

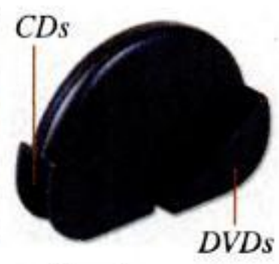

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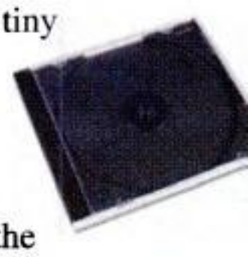

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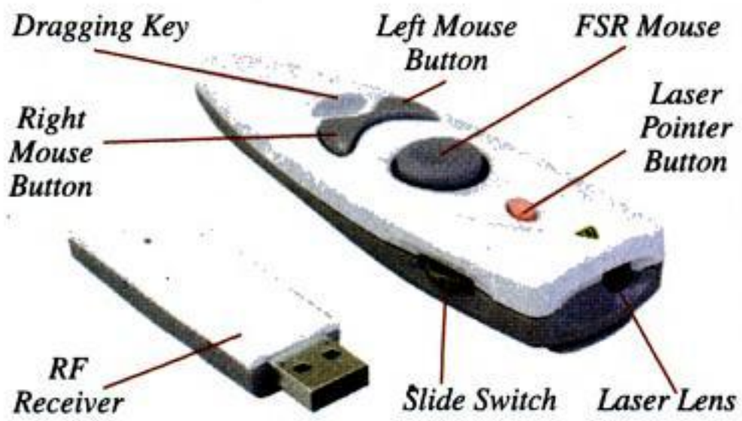

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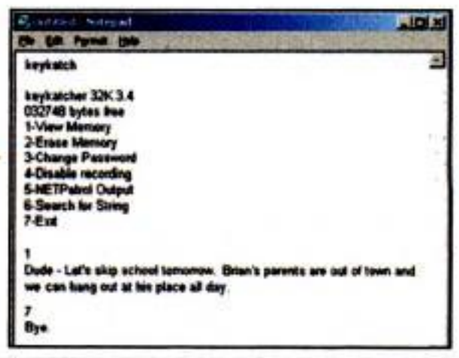

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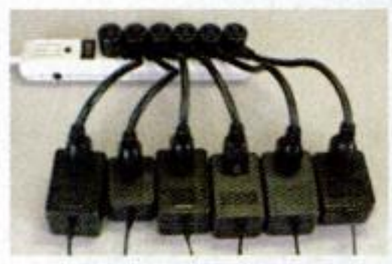

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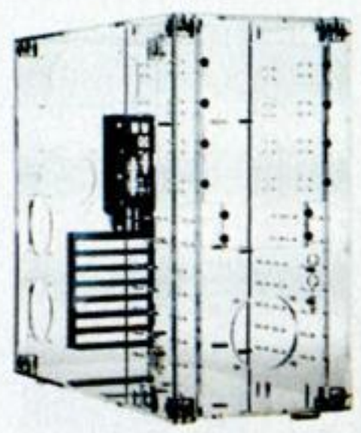

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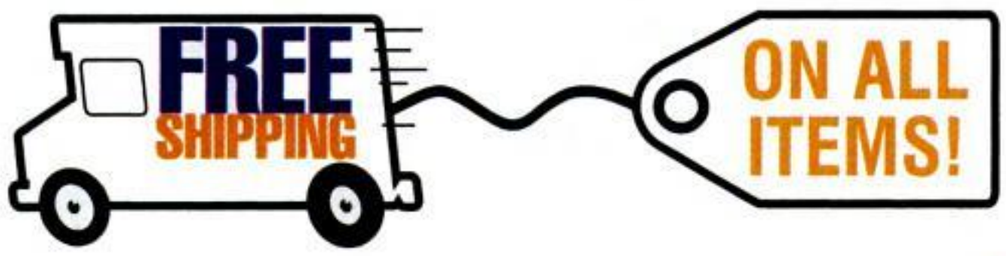

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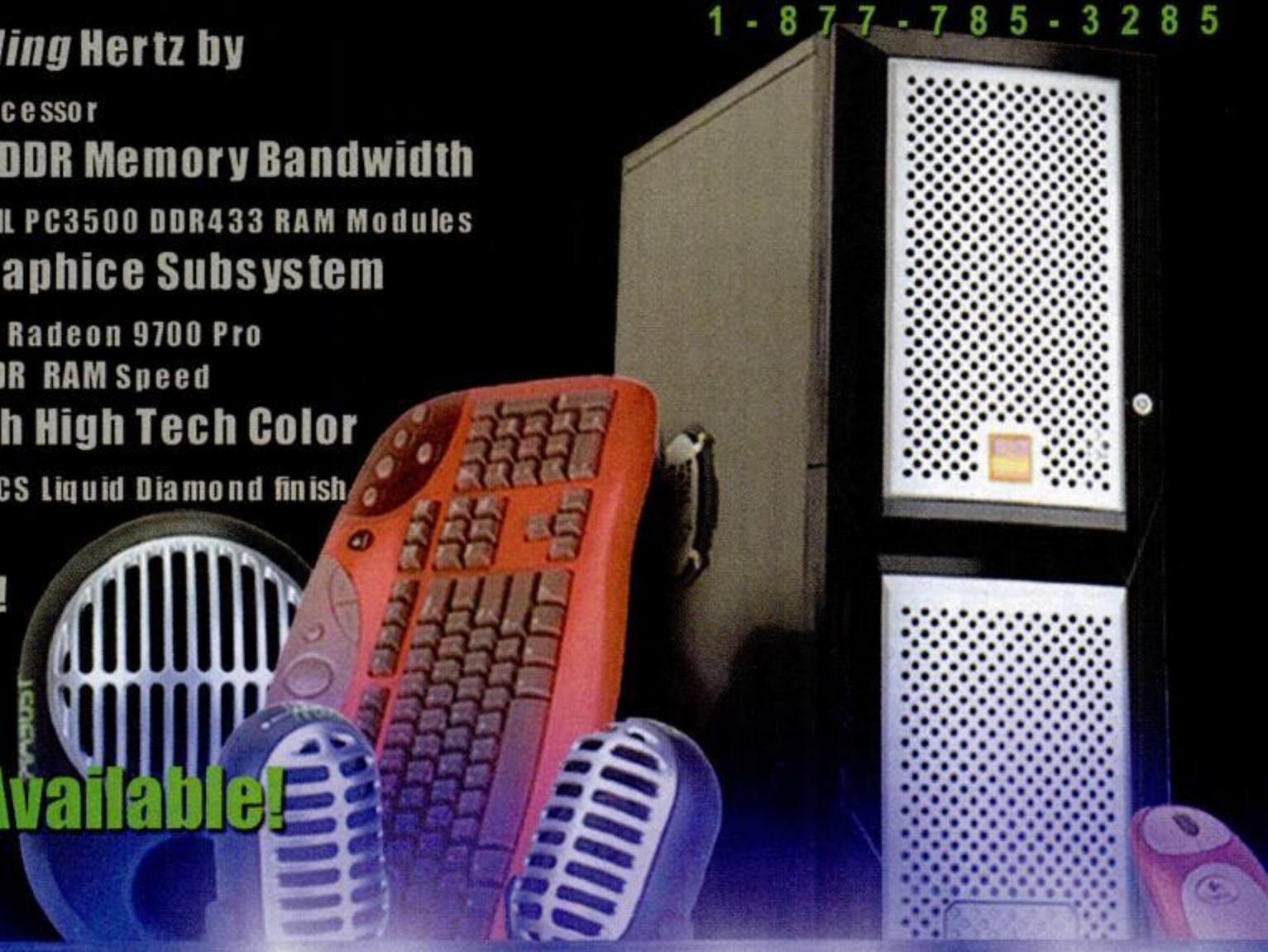

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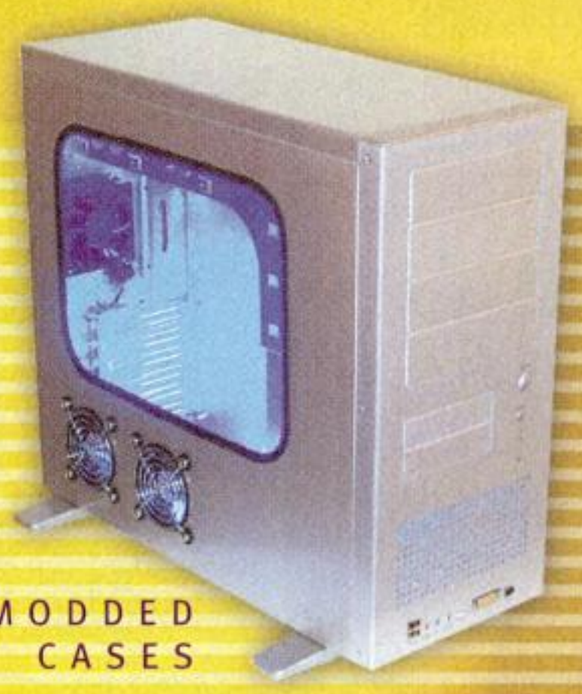

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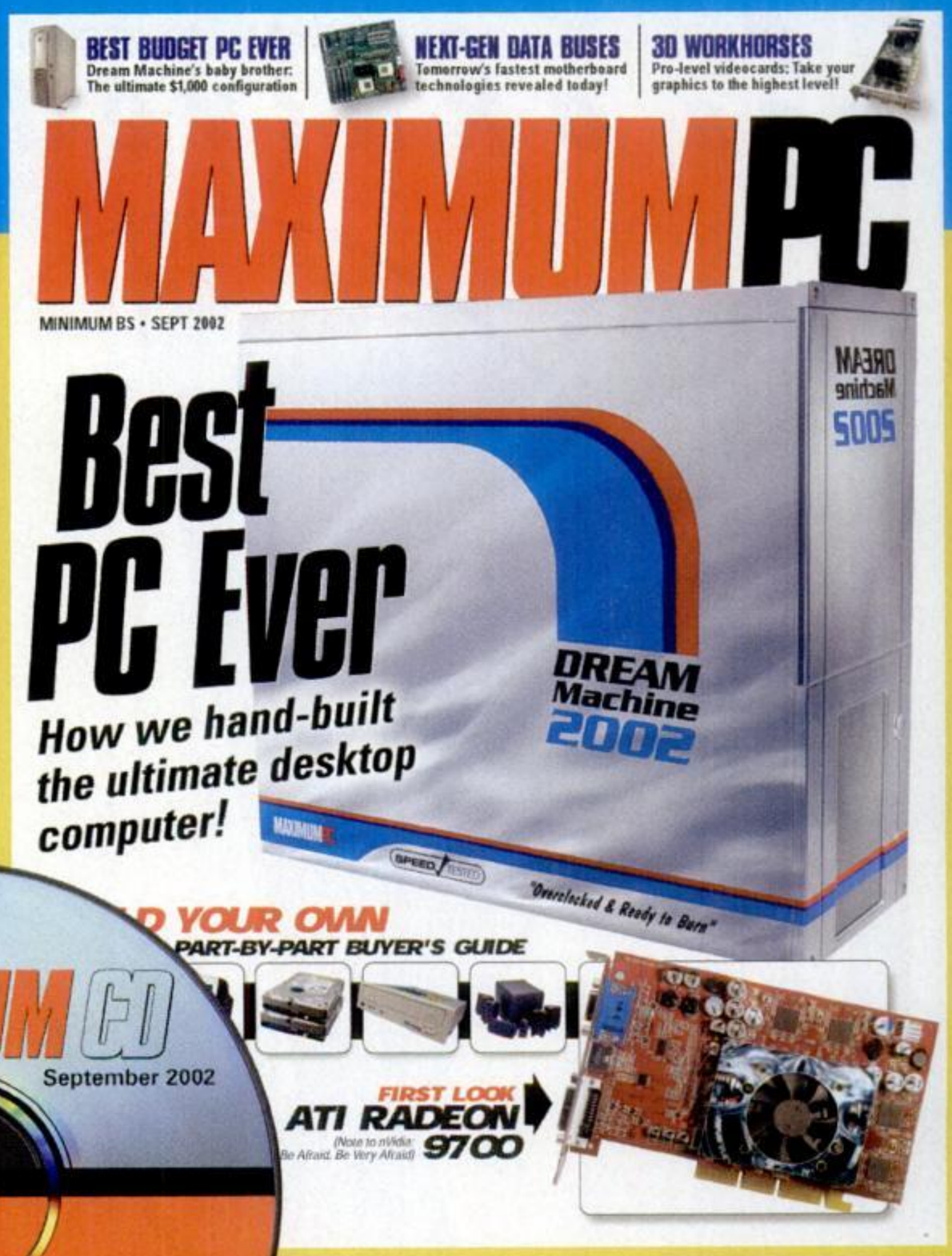
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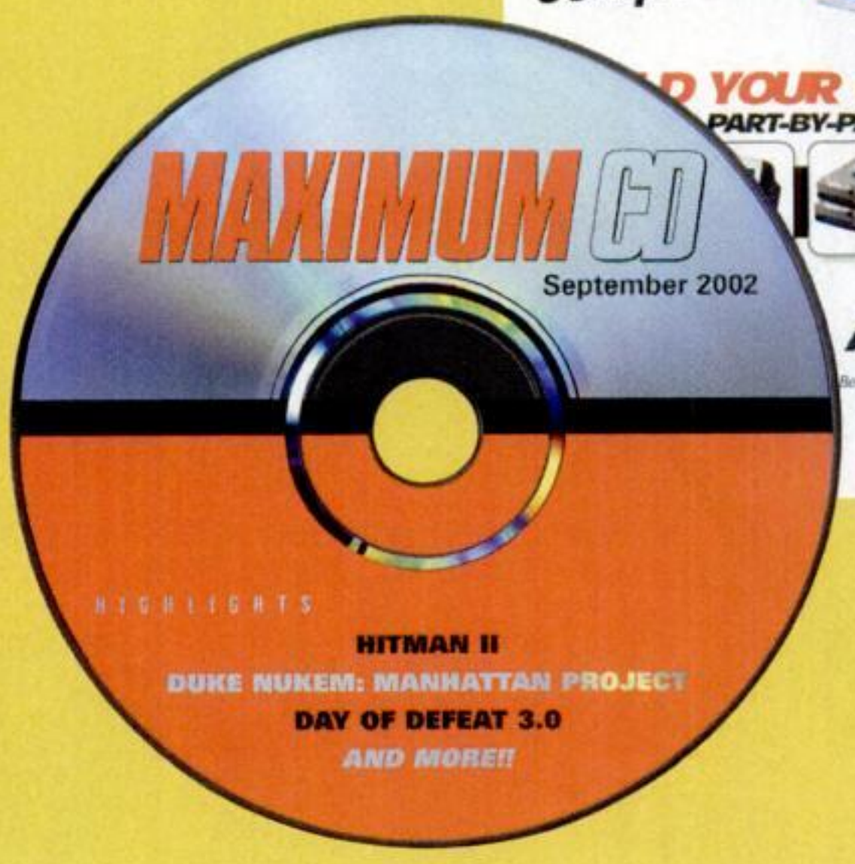

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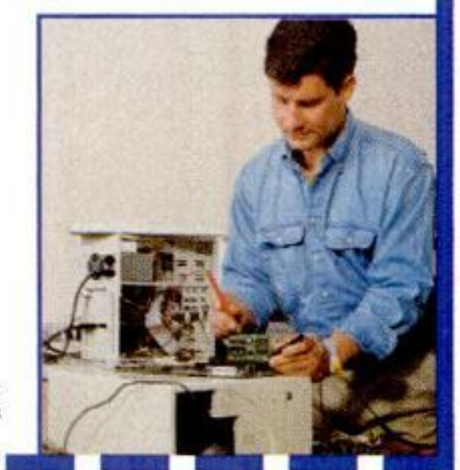

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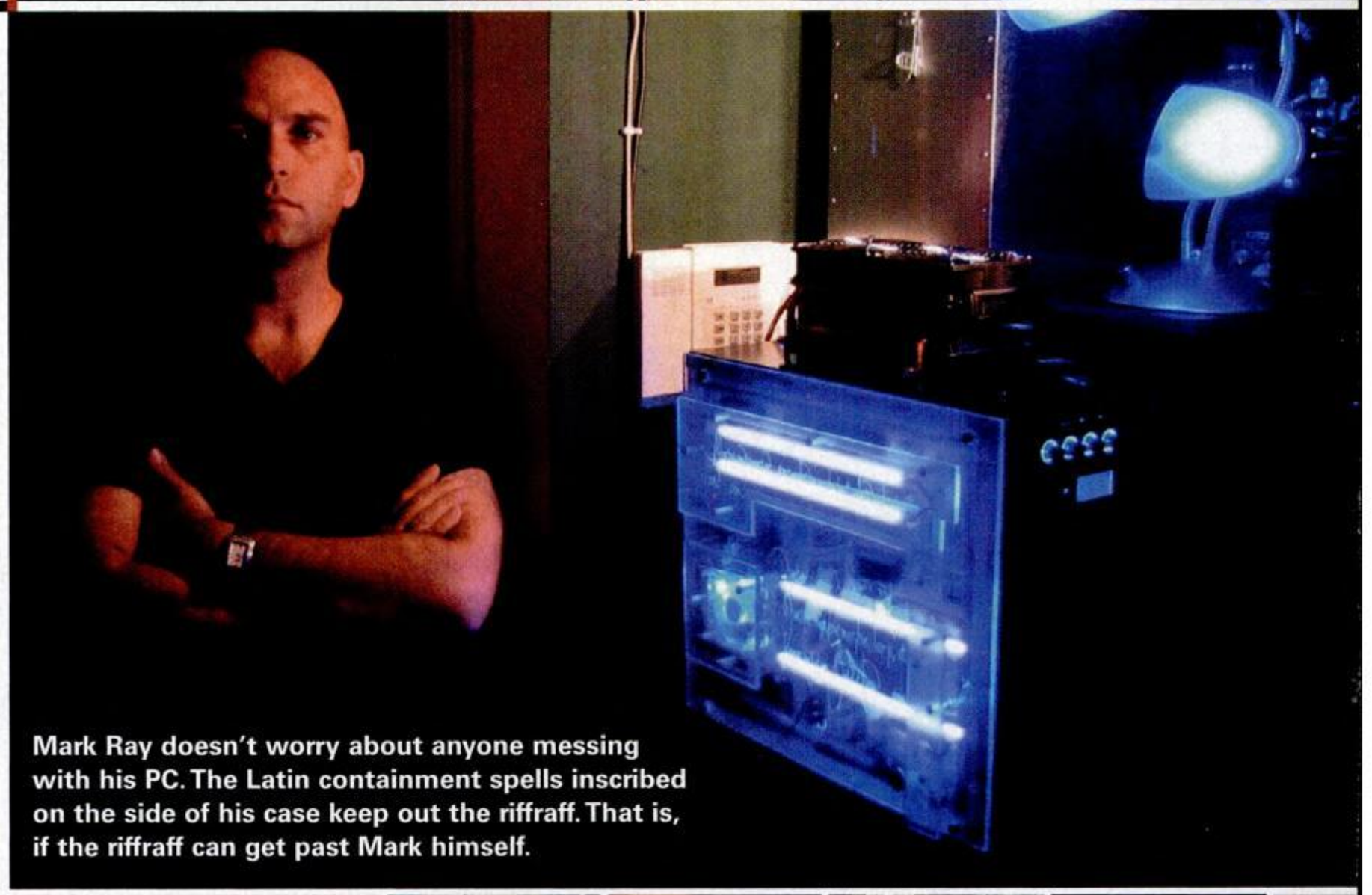
MAXIMUMPC Rig of the Month

THIS MONTH: Mark Ray's "Jackal-in-the-box"

Latin containment spells inscribed on the inside of a case window with ultraviolet ink? Where do people come up with this stuff? Well, it turns out that Mark Ray got the idea for his sinister rig from the horror movie *13 Ghosts*. But the originality of his design is just half the story. The overall construction of the rig is first-rate, and the kernels of wisdom Mark picked up during the course of his project should prove useful to the uninitiated.



Mark Ray doesn't worry about anyone messing with his PC. The Latin containment spells inscribed on the side of his case keep out the riffraff. That is, if the riffraff can get past Mark himself.

The sides of Mark's case were replaced with custom Lexan panels, with standoffs and cutouts providing added dimension. He firmly believes that a table saw is far superior to the "score and snap" method when cutting acrylic, and that plastic is easiest to work with when it's quarter-inch thick. To prevent scratching, leave the protective backing on the plastic until the cutting is done. And if scratching does occur, Mark swears by Novus Plastic Polish.

To create the rig's ethereal illumination, Mark used a combination of high-intensity blue LEDs and black cold-cathode lighting (the inscribed spells appear only when the black lights are flipped on). According to Mark, "high-intensity" LEDs can be 10 times as bright as their cheaper LED counterparts. Cold cathodes provide even greater illumination, but have their own issues: Any more than two sticks will require a larger power supply—100 watts more than what a system typically needs. And if you decide to go the UV route, bear in mind that acrylic tends to block about 70 percent of the UV lights' intensity.

Although equipped with a number of fans, Mark's rig relies heavily on custom water-cooling. And get this: The liquid running through it is windshield-wiper fluid! His reasoning: "It's cheap, it contains methyl alcohol for excellent heat transfer, prevents galvanic corrosion, and is a wicked shade of blue. The alcohol does evaporate after a month or so, but for $1 per gallon, who cares?"

When the cooling's at full throttle, Mark can push his AMD 1.4GHz to 1.7GHz. Although, as the Air Force master sergeant puts it, the fans make a sound like "a Harrier doing a 'touch-and-go'."

The rig is equipped with twin fan buses. One controls four 120mm high-flow fans that cool the interior, and...

The other is for the two 120mm fans atop "the stack" (Mark's pet-name for the radiator assembly that protrudes from the case's top).

If you have a contender for Rig of the Month, e-mail **input@maximumpc.com** with pics and a brief write-up.

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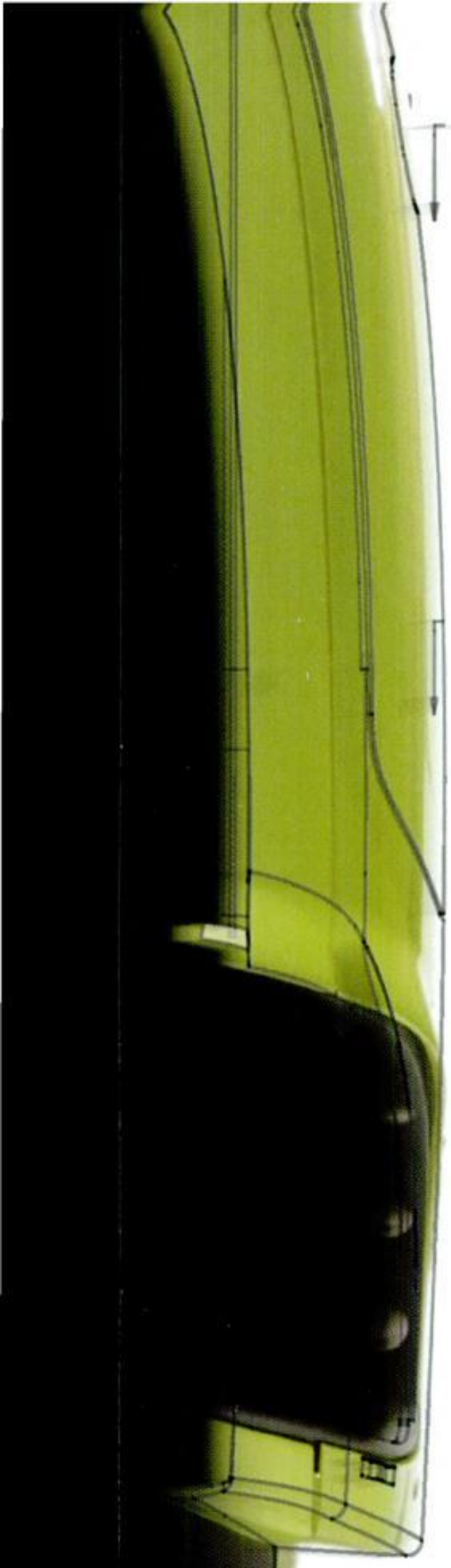

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